MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for September 1902, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: Regular stations of the Weather Bureau, 160; West Indian service stations, 17; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Government Survey, 75; Canadian Meteorological Service, 33; Jamaica Weather Service, 130; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Capt. François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; and Rev. Josef Algué, S. J., Director, Philippine Weather Service; H. H. Cousins, Chemist, and in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or 10^h 30^m west of Greenwich. The Costa Rican standard of time is that of San Jose, 0^h 36^m 13^s slower than seventy-fifth meridian time, corresponding to 5^h 36^m west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

No storms of tropical origin appeared in the middle latitudes of the North Atlantic. From the 1st to the 4th a disturbance passed eastward over the British Isles, with reported barometric pressure 29.07 inches at Malin Head, Ireland, on the 3d, and 29.08 inches at Sumburgh, Scotland, on the 4th. From the 9th to the 12th a disturbance of moderate strength moved from a position near the Azores northeastward to the south part of the North Sea. During the 15th the barometer fell rapidly over Scotland, and on the morning of the 16th a reading of 29.22 inches was reported at Sumburgh. During the 16th the storm center moved beyond the region of observation in the direction of the Scandinavian Peninsula. On the 17th there was evidence of a storm development near the Azores, where a trough of low barometric pressure was shown between two areas of high barometric pressure, one southwest of the British Isles, and the other over the western Atlantic. At 8 a. m. of the 18th the barometer had fallen to 29.74 inches at Horta, Fayal. From the 20th to the 23d the center of this disturbance moved northeastward off the west coasts of Ireland and Scotland, and by the 24th had passed to the north of Scotland.

In the United States the first general frost of the season extended from the Northwestern States over the Lake region and central valleys, and as far south as Arkansas and northern parts of Mississippi, Alabama, and Georgia from the 12th to the 14th. Timely warnings permitted protective measures in the districts visited by frost.

Storms of considerable strength crossed the Lake region on the 3d–4th, 8–9th, 27th, and 30th. On the 12th high winds prevailed on the lower lakes attending a storm that passed over the Ohio Valley. On the 24th high barometric pressure over the northern Lake region and low pressure over the middle and lower Mississippi Valley was attended on Lake Michigan by a northeast gale. Ample warning was given and vessels generally sought shelter.

On the 26th and 27th heavy rains in southern Texas caused some damage to cotton, and resulted in floods that drowned cattle, washed away bridges, and damaged railway tracks. All available means of communication were utilized to distribute warnings regarding the impending floods.

BOSTON FORECAST DISTRICT.

The weather of the month was without special features, excepting the excessive cloudiness which was almost continuous after the 17th.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

The first frost of the season occurred in the northern por-

tion of the district on the morning of the 13th for which warnings were issued on the morning of the 12th.

The Daily States of September 13, 1902, commenting on the forecasts and warnings, says:

The frost predicted for the northwestern portion of the cotton belt came just as expected. The gratifying feature is that no important weather changes take place without timely warning of their coming being given by the Weather Bureau, and the confidence which the people show in these warnings is not misplaced.

I. M. Cline, Forecast Official.

CHICAGO FORECAST DISTRICT.

A larger number of storms than usual for the season crossed the upper lakes. The storms, while not unusually severe, had greater intensity than is generally experienced in September. Warnings were issued well in advance of the gales, and no casualties of consequence have been reported. The first marked frost condition moved from the extreme northwest over the upper Mississippi Valley and the upper Lake region from the 3d to the 5th. On the 12th and 13th frost occurred practically throughout the entire district, freezing temperatures occurred in the western portion of the district, and the frost was heavy as far east as the Ohio Valley. Frost of less consequence occurred at other times during the first and second decades of the month. Warnings were issued well in advance of the frosts.—*H. J. Cox, Professor.*

DENVER FORECAST DISTRICT.

Timely warnings were issued for the first severe frost of the season which occurred in Wyoming and eastern Colorado on the morning of the 12th; also for the heavy frost of the 27th in Utah and the lower Arkansas Valley. Notices of light frost were included in the forecasts.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month as a whole was an unusually quiet one. Dense smoke prevailed from about the middle of the month for a period of a week or more. The smoke was due to extensive forest fires in the northern Pacific coast States.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

The only special feature of the month was a storm which swept across the district on the 26th, in connection with which shipping interests were given ample warnings. Sharp frosts occurred frequently during the latter portion of the month, and as a rule they were accurately forecast.—*E. A. Beals, Forecast Official.*

RIVERS AND FLOODS.

The rivers, as a rule, conformed to the usual periodical custom, and fell steadily during the month except along the eastern slope of the Appalachians, where heavy rains about the end of the first decade caused a general though not particularly marked rise. Still heavier and more general rains during the last few days of the month caused another rise which was much more pronounced along the Susquehanna River, but not so much so as farther south.

In the upper Mississippi and the Ohio rivers the low stages seriously interfered with navigation. The last through boat for St. Louis left St. Paul on the 24th, while on the Ohio navigation was practically suspended north of Cincinnati, only a few local boats remaining on the river. Navigation on the upper Tennessee was also suspended until the heavy rains of the last week of the month afforded some relief.

The highest and lowest water, mean stage, and monthly range at 143 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.*	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	41	101	4, a. m.	46	60	2,250	4.0	562	23.4
II	2, a. m.	52	122	6, p. m.	46	60	3,600	4.5	800	33.3
III	5, p. m.	47	123	9, a. m.	46	60	3,550	3.5	1,014	42.3
IV	8, a. m.	49	124	12, p. m.	46	60	3,800	4.5	844	35.2
V	10, a. m.	51	120	17, p. m.	46	60	3,800	7.5	507	21.1
VI	16, a. m.	51	114	19, a. m.	47	84	1,800	3.0	600	25.0
VII	20, p. m.	47	123	21, p. m.	47	97	1,250	1.0	1,250	52.1
VIII	22, p. m.	51	104	26, a. m.	45	67	2,000	3.5	571	23.8
IX	28, p. m.	47	123	30, a. m.	34	102	1,400	1.5	933	38.9
Sums							23,450	33.0	7,081	295.1
Mean of 9 paths							2,606		787	32.8
Mean of 33.0 days									711	29.6
Low areas.										
I	1, a. m.	54	114	5, a. m.	46	60	3,000	4.0	750	31.2
II	3, p. m.	51	120	6, p. m.	46	84	1,700	3.0	567	23.6
III	6, p. m.	51	114	10, a. m.	48	68	2,250	3.5	643	26.8
IV	{10, p. m. / 12, a. m.	35 / 36	106 / 87	14, a. m.	47	65	{ 2,975 / 1,600	3.5 / 2.0	850 / 800	35.4 / 33.3
V	15, a. m.	50	110	{17, p. m. / 18, p. m.	46 / 29	87 / 89	1,150 / 2,200	2.5 / 3.5	460 / 629	19.2 / 26.2
VI	{18, a. m. / 18, a. m.	51 / 39	120 / 120	24, p. m.	38	90	{ 3,300 / 3,250	6.5 / 6.5	508 / 500	21.2 / 20.9
VII	24, p. m.	51	114	29, a. m.	42	71	2,650	4.5	589	24.5
VIII	27, p. m.	41	118	*1, p. m.	41	70	2,900	4.0	725	30.2
Sums							26,975	43.5	7,021	292.5
Mean of 11 paths							2,452		638	26.6
Mean of 43.5 days									620	25.8

*October.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during September are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

Alabama.—The month was too wet for maturing cotton, much of the open cotton being damaged by rain; light frosts occurred in northern and north-central counties about middle of the month, doing no damage; rains beneficial to minor crops and for fall seeding.—*Thomas Crawford.*

Arizona.—Conditions were unusually favorable for farming operations and crop development throughout the month. Showery weather that began during the first week, extended well into the third decade. The water in the irrigating canals was ample for all requirements. The soil was moist and mellow for fall plowing and seeding during the latter part of the month and this work was in active operation. On account of the seasonable weather an increased acreage will be sown in alfalfa and small grain.—*Wm. G. Burns.*

Arkansas.—The drought continued practically unbroken, except by light and widely scattered showers during the first decade. Cotton deteriorated in all sections, being seriously damaged by excessive heat, rust, and bollworms; it opened rapidly and prematurely, but picking was delayed by the hot weather and scarcity of labor. Late corn was

somewhat damaged by drought in northern counties. General and heavy rains fell during the night of the 11th, followed by much cooler weather, with light frost in some northern localities. Picking of cotton became general about the middle of the month, and progressed rapidly, though considerably delayed by rains during the last week, which caused some rotting and sprouting in the bolls. Considerable corn was gathered, the yield being fair to excellent. Picking of apples was commenced, but the yield was generally light. Not much plowing was done, the ground being too dry for this work. Minor crops received much benefit from the rains of the last week.—*F. H. Coleman.*

California.—Conditions were generally quite favorable for late deciduous fruits and grapes and for rasin making and prune drying. High winds in the interior toward the close of the month caused some injury to late fruits. Forest fires destroyed large quantities of timber and other property. Raisins and prunes are yielding heavy crops. Citrus fruits continue in good condition.—*Alexander G. McAdie.*

Colorado.—The first half of the month was very dry, while the latter half was characterized by a large number of rainy days, with exceptionally heavy precipitation throughout the greater part of the area north of Arkansas-Platte Divide. These heavy rains were opportune in many ways. The large number of forest fires in the mountains were extinguished, the threatened water famine was relieved, water holes on the ranges were filled, and the soil put in fine condition for plowing and the seeding of fall grains. The season was too far advanced for any improvement to result in the condition of the ranges. Frost on the 12th was severe in localities east of the mountains; corn and potatoes were injured, but there was no heavy frost in the lower Arkansas Valley until the latter part of the month, which time usually marks the close of the cantaloupe season. Conditions on the western slope were favorable to the marketing of large crops of late fruits.—*F. H. Brandenburg.*

Florida.—Favorable conditions prevailed during the first part of the month, but the frequent and heavy rains during the second part proved to be rather too severe. Everywhere, except the southern portion of the State, the rains were excessive. Oranges split, but not to a serious extent. Corn, cane, sweet potatoes, and strawberry plants were favored by the weather, and at the close of the month great activity was displayed in preparing for the early vegetable season.—*G. Harold Noyes.*

Georgia.—The weather departed considerably from normal conditions and in some respects was very much like that of September, 1901. The temperature was below the normal and the rainfall above. The first and third decades were generally warm. Cool weather prevailed during the second decade, especially from the 13th to 16th, inclusive, when light frosts occurred in the extreme northern sections. The rainfall was copious in portions of the northern section and over the major part of the southern section. It was largely deficient in the east-central counties, where the monthly totals were generally under 2 inches. Drought was broken in many sections, but the rain came too late to benefit cotton. Much of the open staple was damaged, bolls rotted and plants were blown to the ground by high winds. Owing to the forwardness of the season picking was pushed as rapidly as practicable and was mostly completed. The yield was estimated to be largely below normal.—*J. B. Marbury.*

Idaho.—From the 25th to the 28th local snow squalls occurred in mountain districts, and on the 29th there was a remarkable fall of temperature throughout the extreme eastern counties, causing ice to form in many agricultural sections. Owing to the advanced stage of vegetation the damage was slight. All farm work progressed except fall plowing, which has been delayed owing to hard ground, incident to deficient precipitation.—*S. M. Blandford.*

Illinois.—Cool, very wet weather during the month retarded farm work and delayed maturity of corn, but at the end of the month plowing for wheat and rye was well advanced and seeding had begun in all but the extreme northern portion of the State. The frosts of the 12th, 13th, and 14th did considerable damage to corn on low lands in the northern portion, but throughout the remainder of the State the damage was slight.—*Leon J. Guthrie.*

Indiana.—Corn ripened slowly, but cutting was in progress in some portion of the State throughout the month and the bulk of that work in the central and southern sections was completed. In the northern section corn cutting, as well as plowing and most other outdoor work, was almost wholly suspended during the last week of the month on account of the frequent and heavy rains. But little injury to corn resulted from the frosts and, at the close of the month, practically the entire crop, which promised a heavy yield, was advanced beyond danger of injury. Fall plowing was well advanced and a considerable acreage of seeding was done. Some early planted wheat was up and looking well. Pastures were good, and stock, with the exception of hogs, was in good condition.—*W. T. Blythe.*

Iowa.—The month was too wet and cold for ripening corn and other immature crops, and the frosts from 11th to 13th caused heavy damage to the corn crop, the injury being greatest in the north half of the State. The percentage of soft corn, having but little value except for immediate feeding, will be much greater than usual, ranging from about 25 per cent in southern section to over 60 per cent in the northern section. In quantity all field crops have been much above the average, but the quality has been much impaired, and a large per cent of cereals practically destroyed. It has been the most unfavorable season for farm work that has been experienced in Iowa since 1869.—*John R. Sage.*

Kansas.—The month was cool; the first week was very wet in the eastern division, with little or no rain in the middle and western divisions; the second and third weeks were dry except in the extreme southeastern counties; the last week was very wet except in the extreme southwestern counties. Wheat and rye sowing began the first week and had become general by the third week. Corn cutting continued in the central and northern counties and husking in the central and southern. Prairie haying was pushed in all parts and a large crop was put up. Much alfalfa seed was sown, but all field work was stopped by the heavy rains of the fourth week. Early sown wheat and rye began coming up the second week and by the end of the month a good stand was had over a large part of the State. Apples were fine and the crop large; picking began the last of the month. Potato digging began the latter part of the month. Some damage was done to corn in the shock by the heavy rains the last week, which also damaged some potatoes in the ground.—*T. B. Jennings.*

Kentucky.—Cool weather prevailed quite generally until the last week, causing delay in the maturing and ripening of all crops. Frosts occurred in many localities from the 13th to 15th. It was not severe enough to injure vegetation to any great extent, but a great deal of corn and tobacco was cut green on account of it. The rainfall was abundant, except in the eastern section, and the droughty conditions there were relieved during the last week. Late fields of corn and tobacco improved considerably; pastures revived and good fall grazing is assured. Wheat sowing progressed fairly well.—*H. B. Hersey.*

Louisiana.—The weather during the month was not very favorable for cotton. Hot, dry weather which prevailed prior to, and at the opening of, the month checked the growth of the plant and caused much shedding. The bulk of the crop was open by the middle of the month. The weather was favorable for picking during the early part of the month, but progress was slow on account of lack of labor. Showers toward the close of the month interfered with picking and injured the crop to some extent. In places seed sprouted and lint rotted in the bolls. The crop is very irregular; the conditions vary materially in the same parish. Sugar cane made good growth and developed rapidly. In places the crop is up to an average, but the bulk of the crop is smaller than usual. Rice harvest and thrashing continued during the month. The yield was not satisfactory.—*I. M. Cline.*

Maryland and Delaware.—Frosts of the 4th to 6th and 14th to 16th hurt late corn and late buckwheat, and killed the gardens in the extreme west, but caused no loss elsewhere. Barring local drought, the moisture supply was sufficient for crops, but the ground was too dry for much advance in plowing until the unusually heavy rains of the 24th to 26th, and after that it was entirely too wet for any progress in that direction. Most of the corn was cut and shocked in good condition, the ears on the early corn being fair to good in quality, but those on the late corn were poorly filled. Buckwheat gave fair to good yields. Tobacco was saved, except for some late fields; the crop was short, but the quality good, although damp and foggy weather after the 24th damaged some half cured tobacco in the barns. Winter apples were light; peach yields were concluded after an unsatisfactory season; pears were plentiful and of good quality; potatoes turned out well; tomatoes were still yielding at the close of the month.—*Oliver L. Fassig.*

Michigan.—September was generally an unfavorable month for the maturity of corn, beans, and potatoes on account of the almost uniformly cool nights and much cloudiness and precipitation during the days. Sugar beets did well throughout the month, although better weather conditions could be desired; at the close of the month beet pulling had commenced and the harvest indicated a good crop, the tonnage being very satisfactory and the percentage of sugar somewhat higher than last year. Buckwheat filled and ripened nicely, and its harvest began about the middle of September; the bulk of the crop was secured in good condition before the heavy rainfall of the 23d. Corn made very unsatisfactory progress toward maturity during the entire month; it continued backward, green, and soft. Considerable corn was cut green for fodder; by the 20th corn cutting had become general, but the heavy rains of the 23d to 30th molded much of that which was in shock; high winds and heavy rains beat down much of the uncut corn. Late potatoes continued to show much blight throughout the month, and the very wet soil rotted many of them, especially on low ground; as a whole the late potato crop is a poor one. The rains germinated early sown wheat and rye very rapidly and made pasturage excellent; the soil at the close of the month was in excellent condition for seeding, although that work has been considerably delayed by the continuous rains.—*C. F. Schneider.*

Minnesota.—The frost on the 13th was very severe in all parts of the State, killing ungathered late potatoes, all the corn, except the very earliest, some of which had been gathered, and very small quantities of barley and flax still remaining uncut. Advantage was taken of the dry portions of the month for continuing thrashing from the shock, and beginning thrashing from the stack. The delay in getting the crops off the fields has delayed plowing. The rot in ungathered potatoes was serious. The usual seeding of small areas of rye and winter wheat has been done. The harvesting of a splendid sugar beet crop was begun late in the month.—*T. S. Outram.*

Mississippi.—The heavy rainfalls and deficiency in mean temperature

of the month were unfavorable to cotton, which deteriorated gradually during the month. The unusually large number of cloudy, rainy days caused much bottom cotton to rot and sprout, and also retarded picking; much open cotton was beaten out of the bolls by the rain and wind and its quality thus lowered. In the eastern and southern portions of the State the crop was very light and, notwithstanding the unfavorable weather, picking was nearly completed in some sections, while in the delta and northern counties the outlook was more promising, and from fair to good yields were being secured. Corn gathering was in progress, the yield generally being much below the average. Sorghum was yielding well. Pea vines made a thrifty growth during the month, but did not bear much fruit. Fall gardens and late sweet potatoes were promising. Pastures were in good condition.—*W. S. Belden.*

Missouri.—The cool, showery weather of the month was unfavorable for ripening corn, but practically the entire crop was well matured by the close of the month. Killing frost on the 13th damaged late corn in localities in the northern and eastern sections, but the loss was comparatively slight. During the last decade of the month, however, there was much complaint that corn in shock was molding and that on the stalk sprouting and rotting, especially where down, as a result of continued rainy and cloudy weather. Where thrashing had not been completed, grain in stack was also greatly damaged by the wet weather. Preparations for fall seeding generally progressed favorably until the 20th, the soil being in good condition, and in some localities wheat sowing was nearly completed, but during the remainder of the month work was practically at a standstill. Early sown wheat came up to good stands and made excellent growth.—*A. E. Hackett.*

Montana.—Favorable weather permitted the completion of the wheat and oat harvest during the first part of the month, and thrashing was brought to a close about the 15th; the yield of grain ranged from an average to very good, and in some places was exceptionally heavy. Hay is all in stack and the crop, as a rule, gave a most satisfactory return. The yield of the second crop of alfalfa was quite good in most sections. The late potato crop was generally unsatisfactory, as a considerable portion of it was ruined by frosts or freezes; all late vegetables were also damaged or ruined in like manner. The apple crop in Flathead County proved unusually good. Ranges are very dry.—*Montrose W. Hayes.*

Nebraska.—The first two weeks in September were dry, there being only a very few light showers in the State. The temperature was low and corn did not mature rapidly. However corn made substantial progress during the first ten days. A heavy, and in most places killing, frost occurred on the 12th and 13th. In the northwestern portion of the State a severe frost occurred on the 9th. Corn leaves and tender vegetation were killed except in spots on highland or in protected places. Late corn in the southern counties and all but the early planted in northern counties was injured by the frost. This will make considerable soft or unmerchantable corn; nevertheless the crop of good corn promises to be large. The frost injured hay and fodder crops. The dry weather the first part of the month was unfavorable for sowing wheat and the heavy rains of the last ten days largely prevented sowing, so that the amount of wheat sown at the end of the month was much less than usual. Early sown wheat is up and growing nicely.—*G. A. Loveland.*

Nevada.—Ideal weather for harvesting operations prevailed throughout the State during the entire month. The temperature conditions were about normal, while the precipitation was much lighter than usual for September in nearly all districts. No frosts untill atter part of month, giving late products ample time to ripen.—*J. H. Smith.*

New England.—Much cloudiness prevailed during the month, with precipitation decidedly above the average. The temperature ranged somewhat above the normal, and owing to this fact and the overcast skies during a large portion of the time, frosts were of seldom occurrence and not destructive. The weather was favorable to vegetable growth, but unfavorable to harvesting and housing crops.—*J. W. Smith.*

New Jersey.—The heavy rains that fell from 26th to 29th, inclusive, brought all farm work to a standstill. Winter grain and grass, sown before the rain, were greatly benefited, as well as meadows and pastures. The cool weather during the month retarded the ripening of corn, especially in the northern section, where the crop has been greatly shortened.—*Edward W. McGann.*

New Mexico.—Very dry in northern sections, particularly in the northeast, where the dry season has been unusually severe. There is practically no hay secured in the northeastern counties, and as there is a serious scarcity of winter feed on the ranges many stockmen are preparing to move their stock for the winter. Southern ranges are very good.—*R. M. Hardinge.*

New York.—The month was generally dry until the 23d, and during that time was favorable for maturing and harvesting crops, but it was very rainy after that date, delaying the harvest of corn, beans, buckwheat, and potatoes, and the seeding of wheat and rye, which, however, was well advanced and some was up and making a good start. Corn, beans, and potatoes were very poor, and apples, grapes, and hops were light, but tobacco was saved in good condition. Pastures were good and fall feed plentiful. No generally destructive frosts occurred during the month.—*R. G. Allen.*

North Carolina.—Frequent showers during the first decade of September gave sufficient moisture for growing crops and greatly revived vegetation that had suffered from drought during the latter part of August. The last decade of the month was also warm and showery, favored the development of top bolls of cotton, and placed the ground in excellent condition for plowing and for seeding winter wheat. A long period of abnormally low temperatures prevailed from the 9th to the 20th, which was unfavorable for the maturity of late crops. Frosts occurred on the 10th, 11th, 14th and 15th in western districts, with considerable damage to corn and buckwheat. Cotton did not improve any this month, and by the close nearly three-fourths of the crop had been picked out and very little remained to open. Much early corn was gathered and the crop on lowlands was very fine; young corn remained green and ears filled well. Tobacco continued to cure well, considerable amounts remained uncut in the northwest portion. Good crops of hay, peanuts, rice, and sweet potatoes were secured.—*C. F. von Herrmann.*

North Dakota.—Killing frosts from the 12th to 20th destroyed all vegetation that was not matured, consisting mainly of some late wheat, flax, and corn. Fairly heavy rains in some few sections retarded thrashing and damaged grain in shock and stack by causing it to sprout. High winds during most of the month also delayed stacking and thrashing and destroyed considerable hay. In most sections, fall plowing was either done with difficulty or not done at all on account of the ground being too dry.—*B. H. Bronson.*

Ohio.—The month was cool and wet. Killing frost occurred on most lowlands in the north and central sections on the 14th and 15th and damaged corn, potatoes, and vegetables. Late corn ripened slowly; much early corn was injured in shock by the wet weather. Wheat seeding was delayed, but the early sown came up nicely; clover seed damaged by wet weather. Apples are light crop in central and south and only fair in north.—*J. Warren Smith.*

Oklahoma and Indian Territories.—September was remarkable for continued low temperature and heavy precipitation; the average temperature was the lowest on record, while the precipitation was the greatest, with one exception; heavy rains between the 17th and 23d caused much damage to cotton and lowland property; crop growth and farm work were retarded by cool, wet weather; plowing progressed at intervals, and soft wheat was sown and came up well; rye also came up to a good stand; cotton picking progressed slowly and about half of crop was secured, with poor to good yields; corn, broom and kaffir corn, cane, peanuts, sweet potatoes, and grass were secured with fair to good yields; pastures are good and stock is doing well.—*C. M. Strong.*

Oregon.—The weather during the month was favorable for the completion of harvesting and thrashing, but too dry for pastures and root crops. Hop picking began during the second week and by the 20th work was practically finished in all but a few yards. The crop was slightly below the average but of a superior quality. Prune drying was in active progress at the close of the month.—*Edward A. Beals.*

Pennsylvania.—Droughty conditions extended into and throughout the first decade of the month, causing late corn to dry up before maturing and a delay in the seeding and germination of fall grain. The rainfall was heavy and continuous after the 20th, particularly in the eastern part of the State, where totals of 8 inches and over were recorded. Frosts were quite general on the 14th and 15th and damaging in some localities to late crops, but in most parts of the State vegetation was green and uninjured at the close of the month. No unusual extremes of temperature occurred. Matured crops were secured in good condition.—*T. F. Townsend.*

Porto Rico.—The rains during the first three weeks were local and farm work and growth of crops irregular, but during the last week the rains were general and abundant, greatly reviving suffering vegetation as well as permitting the active resumption of work in the fields. The planting of cane for gran cultura, already so long delayed, was commenced with vigor. In places the young canes were checked but it is thought they experienced no real harm. Owing to the drought coffee berries matured very slowly and little picking has yet been done; the crop promises a large yield. A considerable quantity of tobacco seed was planted during the month, but the seed beds were more or less damaged by the heavy showers and the overflowing streams in places. The harvesting of the corn and rice crops was completed. Yield of rice cut short by the dry weather. Fruits abundant and excellent. Vegetables and ground provisions generally plentiful. Pasturage good.—*E. C. Thompson.*

South Carolina.—Although the temperature was below normal it was never sufficiently cool to check the growth of fall crops. The precipitation was unevenly distributed, but was beneficial, although slightly damaging to lands in a few places, and the rains interfered with haying and cotton picking to some extent. Late corn ripened and, under the influence of favorable weather, became a promising crop. Early corn was gathered. Cotton opened rapidly and picking made equally rapid progress and was more nearly finished than is usual in September. In some fields there is a luxuriant new growth that bloomed profusely and fruited heavily, but will require an exceptionally late fall to mature. Sea island cotton developed into a fine crop. Rice was largely harvested. Sweet potatoes and other minor crops, gardens and truck, did well and improved throughout the month. The weather was altogether favorable to to agricultural interests. Some oats were sown and came up to good stands.—*J. W. Bauer.*

South Dakota.—Dry weather prevailed until the 15th, when the stack-

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings:

Summary of temperature and precipitation by sections, September, 1902.

Section.	Temperature—in degrees Fahrenheit.							Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.					Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest. Date.			Station.	Amount.	Station.	Amount.
Alabama	73.4	−1.6	Daphne	97	1	Newberg	34 13	4.28	+1.18	Riverton	12.41	Helena	0.40
			Tuskegee		2								
Arizona	75.8	−0.3	Aztec	116	4, 5	Flagstaff	22 29	1.08	−0.06	Yarnell	3.15	Several stations	0.00
Arkansas	68.4	−5.3	Malvern	99	8	Pond	30 13	5.06	+2.02	Pinebluff	9.31	Dardanelle	2.63
						Witts Springs	14						
California	70.7	+1.6	Volcano	118	6	Bodie	6 26	0.01	−0.38	Crescent City	0.76	Many stations	0.00
Colorado	57.0	−2.0	Blaine	105	7	Breckenridge	12 26	1.91	+0.91	Fort Collins	7.12	Lamar	0.00
Florida	79.4	+0.5	Rockwell	100	1	Molino	53 15	9.44	+2.10	Fernandina	20.25	Key West	3.37
			Molino		6								
Georgia	73.0	−1.4	Millen	100	4	Clayton	40 14	4.64	+1.10	St. Marys	18.26	Hephzibah	0.55
Idaho	56.8	+0.3	Payette	99	8	Chesterfield	9 29	0.51	−0.42	Murray	2.22	3 stations	T.
Illinois	62.8	−3.9	Flora	94	17	Lanark	29 12	4.14	+0.94	Antioch	7.35	Cisne	1.55
Indiana	63.8	−3.4	Washington	95	3	Winamac	28 14	4.76	+2.00	Fort Wayne	9.87	Mount Vernon	2.46
Iowa	59.1	−5.2	4 stations	88	2, 7	Galva	23 11	4.35	+1.36	Ottumwa	10.41	Clear Lake	1.65
Kansas	63.8	−5.0	Viroqua	102	7	Achilles	24 12	3.62	+1.01	Wakeeney	8.57	Viroqua	0.25
Kentucky	67.3	−3.1	Pikeville	97	8	Marrowbone	29 14	4.01	+1.34	St. John	8.26	Richmond	1.58
Louisiana	76.4	−1.2	Minden	102	2	Robeline	40 14	6.24	+2.50	Jennings	10.94	Abbeville	3.36
Maryland and Delaware	66.1	−1.5	Chewsville, Md	101	1	Deerpark, Md	25 15	6.19	+2.08	Colora, Md	12.93	Cumberland, Md	1.38
Michigan	58.0	−2.2	Mount Clemens	90	1	Sidnaw	19 14	3.96	+1.36	Hagar	8.22	Petoskey	0.23
			Owosso		4								
Minnesota	55.2	−4.0	Beardsley	96	7	Beardsley	19 18	2.23	−0.56	Albert Lea	5.37	Beardsley	0.06
Mississippi	73.4	−2.0	Okolona	98	1	Aberdeen	34 13	5.12	+2.06	Fayette	11.26	Okolona	2.57
Missouri	63.2	−5.9	Willow Springs	95	7	Ironton, Potosi	30 14	4.77	+1.37	Wheatland	10.92	Hermann	1.81
Montana	53.1	−1.1	Crow Agency	92	4	Culbertson	15 17	0.48	−0.55	Bozeman	2.07	Fort Benton	0.00
			Glasgow		24								
Nebraska	59.6	−3.9	Callaway, Imperial	100	7	Gering	21 12	3.54	+1.54	Franklin	7.40	Cody	0.08
Nevada	61.1	0.0	Rioville	113	6	Quinn River Ranch	10 29	0.21	−0.11	Eureka	1.00	Several stations	0.00
New England	61.6	+1.3	Nashua, N. H	95	1	Patten and Van Buren, Me	27 26	4.49	+2.15	Jacksonville, Vt	7.92	Newport, Vt	1.14
New Jersey	64.6	−1.7	Indian Mills	93	1	Charlotteburg	30 15	5.65	+1.97	Layton	8.95	Lakewood	3.11
New Mexico	62.3	−1.7	Carlsbad	101	10	Winsors	20 27	0.96	−0.68	Roswell	3.08	Albert	T.
New York	60.8	+0.4	Saratoga Springs	94	1	Axton	22 5	3.94	+0.47	Southampton	8.94	De Kalb Junction	0.50
North Carolina	68.9	−1.6	Selma	98	3	Linnville	27 14	4.56	+0.22	Horse Cove	11.30	Mocksville	2.32
North Dakota	53.6	−3.8	Napoleon	95	7	Gallatin	15 12	0.73	−0.24	University	2.08	McKinney, Minot	T.
			Fort Yates		8								
Ohio	63.6	−2.0	Thurman	94	23	Atwater	24 15	4.55	+1.94	Bowling Green	9.25	Warsaw	2.07
Oklahoma and Indian Territories.	68.2	−5.4	Goodwater, I. T	104	1	Beaver, Okla	32 27	5.94	+3.12	Holdenville, I. T	13.55	Beaver, Okla	0.00
Oregon	60.0	+1.0	Grant's Pass	103	9	Bend	12 28	1.01	−0.89	Glenora	4.65	Klamath Falls	0.00
Pennsylvania	62.7	−1.0	Huntingdon	99	2	Dushore	28 15	4.66	+1.61	Pocono Lake	11.95	Elwood Junction	1.50
Porto Rico	79.1	−0.6	Hacienda Perla	99	4	Barros	55 16	6.72	−1.14	San Salvador	13.57	Hacienda Amistad	2.28
South Carolina	72.1	−2.2	Beaufort	98	2	4 stations	43 *	3.74	−0.11	Beaufort	7.97	Bowman	1.10
South Dakota	57.8	−4.0	Bowdle	101	7	La Pelle	19 12	1.02	−0.31	Yankton	8.17	Pedro, Wessington Springs	T.
Tennessee	68.0	−2.1	Springfield	97	8	Rugby	29 14	4.61	+1.57	Franklin	9.26	Dyersburg	1.74
Texas	76.4	−1.3	Fort Ringgold	105	6, 9	Mount Blanc	39 13	5.02	+1.88	Cuero	12.03	Fort McIntosh	0.09
			Haskell		8	Amarillo	30						
Utah	60.1	−0.7	St. George	103	3, 6, 7	Woodruff	10 17	0.56	−0.24	Monticello	2.09	Blue Creek, Promontory	0.00
Virginia	66.4	−2.7	Bedford City	95	1	Burkes Garden	28 15	3.62	−0.16	Charlottsville	6.46	Stephens City	1.46
Washington	57.3	−0.3	Lind	98	6	Wilbur	20 23	1.64	−0.21	Clearwater	5.17	Trinidad	0.01
West Virginia	64.8	−2.4	Magnolia	98	2	Travellers' Repose	25 15	2.98	+0.31	Elkins	4.81	Creston	1.23
Wisconsin	57.0	−3.4	Racine	89	1	Prentice	21 13	3.95	+0.21	Racine	6.80	Appleton	1.39
Wyoming	53.6	−2.4	Basin	95	4	Iron Mountain	12 12	1.18	+0.33	Cheyenne	3.52	Border	0.02
			Thermopolis		7								

* 13, 15, 16.

ing of spring wheat, oats, and barley was completed. The thrashing of these grains, although somewhat retarded in southeastern counties by rains after the 15th, and a little by winds, was by the close of the month over half completed, with generally satisfactory yields, especially of oats and barley. Corn made fairly good progress during the first decade, but the crop was permanently and very seriously damaged by severe frost on the 12th and 13th. At the close of the month the indications were that probably less than half of the crop had escaped material injury, that much would be soft but would likely make fairly good feed, and some was spoiling, with picking of the matured, and cutting of much of the damaged for fodder, becoming general. Plowing was retarded in some northern counties by dry soil, but progressed well in the southeastern counties. Potato digging and haying made very good progress and winter rye sowing was favorably advanced. Flax yields were fair to good. The frost killed most garden stuff and some late potatoes and flax, and injured some late fruit.—*S. W. Glenn.*

Tennessee.—The rainfall was generally ample for growing crops, and during the latter half of the month conditions were very favorable for plowing and for seeding wheat and oats. Early sown oats and rye and second crop of Irish potatoes came up well and made good growth. Tobacco developed well and most of the crop had been cut and some of it cured by the end of the month; considerable injury to this crop resulted from frosts on the 13th and 14th. Cotton opened rather slowly, as a rule, and toward the end of the month picking was delayed by rains, which also considerably damaged the staple in the fields. Late corn improved decidedly during the month.—*H. C. Bate.*

Texas.—There were no notable phenomena recorded within the State during the month. Agriculturally, the event of the month was the breaking of the severe August drought by general rains during the first week in September. These rains were followed later in the month by heavy rains over nearly the entire State, which thoroughly stocked the soil with water and gave ideal conditions for seeding grain and planting fall gardens. Cotton picking was interrupted frequently by rain and during the last decade there was much complaint of open cotton sprouting, molding, and rotting; the bulk of the crop had been picked, however, prior to the September rains, and the portion of the crop adversely affected was comparatively small. Weevil continued to inflict damage to forms and squares and in scattered sections bollworms were numerous. Cotton made a rapid second growth, and in scattered sections gave promise of a fair top crop. Wheat, rye, oats, and barley seeding were accomplished in many sections under favorable conditions, and the early seedings were up to fine stands at the close of the month. The September rains greatly improved pastures and forage crops, and stock generally showed improvement in condition as a result of abundant feed.—*Edward H. Bowie.*

Utah.—The rainfall of the northern and southern sections was generally too light to be of service, and that of the middle section came too late to be of very much benefit to the ranges. The ground was generally too dry for fall plowing and seeding. Killing frost was quite general over the State on the mornings of the 26th and 27th, but crops were too far advanced to be much damaged thereby.—*L. H. Murdoch.*

Virginia.—With the exception of two brief cool periods, the month was

favorable for the growth and maturing of crops in the eastern portion. Drought prevailed in the western portion, seriously affecting late corn, potatoes, and pastures, and retarding fall plowing and seeding.. Tobacco was cut and housed under favorable weather conditions.—*R. F. Young.*

Washington.—The month was exceedingly favorable for the harvesting of crops and all were secured in good condition. It was too dry for pastures and late vegetables during the first half of the month. Copious showers on the 18th and 19th and general rains from the 24th to the 27th, inclusive, broke the drought, revived pastures, and put the soil in good condition for fall seeding and plowing.—*G. N. Salisbury.*

West Virginia.—September was rather a cool month, and the dry weather was unfavorable for crops. During the last week fairly good showers fell, which were very beneficial in softening the soil, furnishing a water supply, and freshening pastures; late corn was considerably improved by the warm, showery weather, and will make about a half crop; fall plowing was in full progress and buckwheat was being thrashed with a fairly good yield; cabbages, turnips, and late Irish potatoes will make about half crops, and stock was in fairly good condition.—*E. C. Vose.*

Wisconsin.—The first killing frosts of the season occurred generally throughout the State on the 12th and 13th, except for a few favored localities in the southern counties and a narrow strip bordering on the lake. Corn had generally not reached maturity, and the damage was very great. There will be very little hard corn in the State. The late potatoes were also injured by the frosts. The apple crop made surprising improvement during the months of August and September, and a large crop of excellent quality is being harvested. The cranberry crop was injured to a considerable extent by the frost. Damage to the cultivated marshes where there was sufficient water for flooding was not great, but wild bogs suffered severely.—*W. M. Wilson.*

Wyoming.—The month was a cool one, but much fine, pleasant weather prevailed. The first half was very dry, practically no rain falling, but during the latter half unusually heavy rains fell all over the State and were of much value to the stock interests. Farming operations progressed favorably. Grain cutting and thrashing made good progress during first half of month with yield below average. Native hay and alfalfa all in, with average crop for whole State, but large shortages in sections, inducing some early and heavy shipments of cattle. Stock as a rule in good condition. A general frost on 12th did little damage as most crops were gathered. Ranges revived somewhat and streams flushed as result of heavy rains.—*Charles E. Ashcraft, Jr.*

SPECIAL CONTRIBUTIONS.

THE RAINFALL IN THE CITY OF MADRAS AND THE FREQUENCY OF SUN SPOTS.

By M. B. SUBHA RAO, First Assistant, Observatory, Madras, India.

The high temperatures that prevailed in Madras during 1900 and the scarcity of rain both in 1899 and 1900, made me think that these high temperatures might possibly be connected with the paucity of rain. With the object of investigating the subject, I began to hunt up the records at hand and was led to believe that the period 1899 and 1900 resembled the period 1867–68 in many respects. With the little experience I had in meteorological work, as well as with records at hand to fall back on, I began at the middle of 1900 to write short notes predicting the condition of weather at Madras for a local biweekly paper. Emboldened with the success of my prediction I thought of making a thorough investigation of the matter.

Just then the question of the relation of Indian famines and the sun spots was being discussed in the scientific world. I thought then I had better have the list of sun-spot frequency with me before I commenced with the work. Early last October, I applied ultimately to Prof. C. Abbe, of Washington, for a copy of the list, and in December last I was kindly favored by him with one from the year 1749 to 1899.[1] But untoward circumstances prevented me from taking up the work in hand till the end of this April, though I had been collecting the material required since 1900.

Temperature and rain.—Generally years during which high temperatures are recorded are dry years, on some occasions the rainfall being much below the average (49.02 inches). But the years 1870, 1872, 1877, 1880, 1883, 1884, 1887, 1896, and 1898 are found to be exceptions to the rule. During these years the rainfall was very heavy. The years 1870, 1873, and 1874 are rather remarkable ones. The rainfalls for these years are among the highest on record, and occurred in the years of the maximum sun-spot frequency. If the high temperatures are dependent on a low frequency of sun spots, or both of them are caused by something unknown emanating from the sun, these years are a strange exception to the rule. It is curious to note, however, that the heaviness of rain during these exceptional years is caused by the northeast monsoon, which lasts in Madras generally from the middle of October to the middle of December. On the other hand, the years in which low temperatures are recorded are not exclusively years of heavy rain. During 1864, 1865, 1885, and 1899, though the highest temperatures recorded are much below 105° F., the rainfall is also much below the average.

These apparent exceptions can not be satisfactorily explained. If, perhaps, the whole of the east coast meteorological phenomena are taken into consideration the anomaly might probably disappear, or could, with satisfaction, be explained as due to some local cause or other.

Rain and sun spots.—From Tables 1 and 5 it is very clear that the minimum rain occurs almost exactly on the year of minimum frequency of sun spots, the difference being only a year in a few cases.

TABLE 1.

Period.	Years in the period.	Years of minimum sun spots.	Years of minimum rain.
1811–1823	12	1825	1823
1823–1833	10	1833	1832
1833–1843	10	1843	1842
1843–1856	13	1855	1855
1856–1867	12	1867	1867
1867–1878	11	1878	1876
1876–1889	11	1879	1880
1889–1900*	12	1900	1900

* In 1901 the minimum frequency occurs.

TABLE 2.

Period.	Years in the period.	Years of maximum sun spots.	Years of maximum rain.
1811–1823	12	1816	1815
1823–1833	10	1830	1827
1833–1843	10	1837	1839
1843–1856	13	1848	1847
1856–1867	12	1860	1859
1867–1878	11	1870	1870
1878–1889	11	1883-84	1883
1889–1900	12	1893	1896

From Tables 2 and 5 it is to be seen that the maximum rainfall also takes place when we have the maximum frequency of sun spots. But in this case the difference is sometimes two to three years during one or two periods. It is, however, probable that this discrepancy can be avoided or be satisfactorily explained by taking the mean precipitation of the whole of the east coast, say from 8° to 20° latitude. The problem is worth trying.

Table 3 gives the mean precipitation, both when the sun-spot curve is in ascendance and descendance.

It is generally observed that the fall of rain is greater during the rise than when the curve is descending.

[1] The copy here referred to as communicated to Mr. Subha Rao in December, 1901, was practically the same as that which was printed in the MONTHLY WEATHER REVIEW for November, 1901, pp. 505–506. The thorough and important revision of "Wolf's relative numbers for sun spots," published in the MONTHLY WEATHER REVIEW for April, 1902, and elsewhere by Prof. A. Wolfer, of course replaces all the earlier publications on this subject, but the introduction of these numbers into the present memoir would not materially change the conclusions of its distinguished author.

TABLE 3.

Period.	Condition.	Rainfall.	Period.	Condition.	Rainfall.
		Inches.			*Inches.*
1823–1830	Rise.	52.3	1830–1833	Fall.	33.3
1833–1837	Rise.	43.6	1837–1843	Fall.	51.4
1843–1858	Rise.	73.7	1848–1856	Fall.	46.5
1858–1860	Rise.	46.0	1860–1867	Fall.	42.1
1867–1870	Rise.	49.3	1870–1878	Fall.	49.8
1878–1884	Rise.	58.3	1884–1889	Fall.	53.3
1889–1893	Rise.	36.1	1893–1900	Fall.	48.6

There is another fact to be noticed from the data given in Table 5. A periodicity of eleven to thirteen years is observed in the occurrence of both the rain and the sun-spot minima. From these periods a cycle of thirty-three to thirty-five years may be deduced and partly because of this fact I thought, as I have said before, that the years 1867 and 1868 closely resembled the years 1899 and 1900.

In Table 4 the highest average rain in each period for three years is compared with the highest frequency of sun spots and the reader is left to deduce the inference himself.

TABLE 4.

Period.	Highest average rain.	Years.	Highest average sun spots.	Years.
1811–1823	60.32	1816–18	41.1	1815–17
1823–1833	68.48	1825–27	66.8	1828–30
1833–1843	51.55	1837–39	121.0	1836–38
1843–1856	71.85	1846–48	106.2	1847–49
1856–1867	46.75	1864–66	81.6	1859–61
1867–1878	68.04	1870–72	114.0	1870–72
1878–1889	63.19	1882–84	62.3	1882–84
1889–1900	54.61	1894–96	78.9	1892–94

As to whether the numerical frequency of sun spots has any ratio to the measured amount of precipitation is altogether beyond determination for many reasons, especially when the statistics of only one single station are taken into consideration.

TABLE 5.

Year.	Rain.	Frequency of sun spots.	Year.	Rain.	Frequency of sun spots.	Year.	Rain.	Frequency of sun spots.	Year.	Rain.	Frequency of sun spots.
1813	45.11	12.8	1835	41.47	56.9	1857	52.95	22.8	1879	54.25	6.0
1814	32.41	14.4	1836	44.76	121.8	1858	48.50	54.8	1880	61.80	32.3
1815	56.00	35.4	1837	49.26	138.2	1859	55.14	93.8	1881	44.04	54.3
1816	41.16	46.4	1838	52.33	103.1	1860	27.64	95.7	1882	50.20	59.6
1817	63.56	41.5	1839	53.07	85.8	1861	37.19	77.2	1883	60.54	63.7
1818	76.25	30.0	1840	58.65	63.2	1862	38.18	59.1	1884	78.92	63.5
1819	36.33	24.2	1841	58.19	36.8	1863	54.61	44.0	1885	47.88	52.2
1820	70.01	15.0	1842	36.48	24.2	1864	47.23	46.9	1886	47.78	25.4
1821	47.13	6.1	1843	50.28	10.7	1865	41.64	30.5	1887	70.24	13.1
1822	59.61	4.0	1844	65.36	15.0	1866	51.39	16.3	1888	62.48	6.8
1823	26.62	1.8	1845	37.65	40.1	1867	24.37	7.3	1889	43.39	6.3
1824	33.72	8.0	1846	79.81	61.5	1868	41.43	37.3	1890	27.99	7.1
1825	56.05	15.6	1847	80.99	98.4	1869	32.31	73.9	1891	30.46	35.6
1826	60.73	36.0	1848	54.76	124.3	1870	74.10	139.1	1892	42.04	73.8
1827	88.66	49.4	1849	39.81	95.9	1871	56.35	111.2	1893	43.98	84.9
1828	37.89	62.5	1850	36.88	66.5	1872	73.67	101.7	1894	47.78	78.0
1829	36.87	67.3	1851	64.32	64.5	1873	51.83	66.3	1895	47.37	64.0
1830	32.43	70.7	1852	72.69	54.2	1874	62.90	44.6	1896	68.68	41.8
1831	44.35	47.8	1853	35.82	39.0	1875	37.12	17.1	1897	38.47	26.2
1832	18.45	27.5	1854	43.20	20.6	1876	21.60	11.3	1898	68.14	26.7
1833	37.11	8.5	1855	32.32	6.7	1877	66.20	12.3	1899	41.00	12.1
1834	39.00	13.2	1856	46.99	4.3	1878	28.65	3.4	1900	28.93	9.5

Before closing the subject I shall have to say something about the extraordinary weather conditions in Madras during 1900, as the conclusions that may be arrived at have a bearing on the subject at issue. Fig. 1 gives the mean maximum temperature and the wind direction for 1900 as compared with the normal. It at once strikes the observer that the wind direction curve is abnormal, being more westerly from June to September. Following it, the temperature curve reads higher for the same period, the difference in August being most marked, being nearly 5° F. higher. The rainfall for the whole year was only 28.93 inches and only 14 inches fell during the northeast monsoon for a normal of more than double the quantity. Naturally the barometer reading for the period was lower than usual. One of the consequences of this was that during the prevalence of a high temperature on the east coast the rainfall on the west coast in some localities, i. e., between Karwar and Goa, was abnormally high.

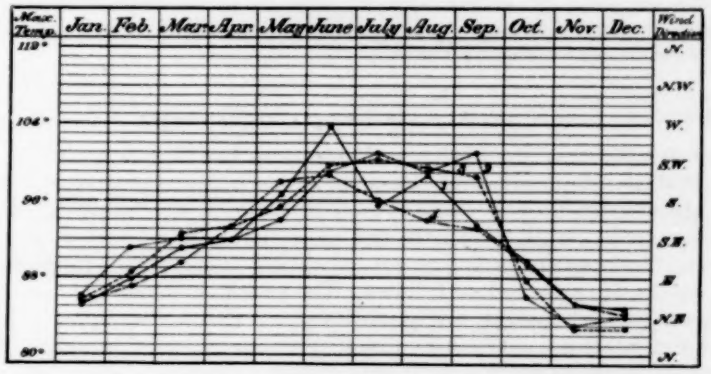

FIG. 1.—Mean maximum temperature and wind direction for 1900.

TABLE 6.

Years of maximum temperature above 105° F.	Highest Temperature.	Date.	Total rain.	Remarks.
1841	106.4	May 8	58.19	
1845	105.2	May 22	37.65	
1847	105.2	April 26	80.99	
1848	106.2	June 21	54.76	
1849	108.3	June 9	39.81	
1853	106.6	May 20	35.82	
1854	110.2	May 28	43.20	
1855	110.6	May 27	32.32	
1860	106.0	May 25	27.64	
1861	106.9	May 12	37.19	
1862	107.1	May 30	38.18	
1866	110.6	May 28	51.39	Extraordinary fall of 21.80 inches in the first week of December.
1867	107.3	June 1	24.37	
1868	106.7	April 30	41.45	
1869	106.4	June 15	32.31	
1870	110.6	May 12	74.10	Extraordinary fall of 6.55 inches in January.
1872	107.5	May 26	73.67	
1873	106.3	June 1	51.83	Heavy rain in February, 6.28 inches.
1875	109.6	May 8	37.12	
1876	109.1	May 15	21.60	
1877	107.3	May 25	66.20	20.60 inches due to a heavy cyclone, May 16–18.
1878	109.5	June 2	28.65	
1879	108.3	April 15	54.25	
1880	107.9	May 30	61.80	
1881	112.9	May 21	44.04	
1882	107.9	May 23	50.20	
1883	107.7	May 24	60.54	
1884	107.5	May 17	78.92	Heavy rain of 33.49 inches in November.
1886	106.5	May 9	47.78	
1887	106.7	May 17	70.24	
1889	108.1	May 21	43.39	
1890	109.0	May 9	27.99	
1891	107.3	June 6	30.46	
1892	108.4	May 22	42.04	
1893	107.6	May 2	43.98	
1894	109.7	June 1	47.78	
1895	109.1	May 18	47.37	
1896	112.4	May 15	68.38	Heavy rain of 32.75 inches in November.
1897	107.1	May 16	38.47	
1898	109.8	May 9	68.14	
1900	109.8	June 3	28.93	

Some are led to think that the effect of sun spots on the quantity of rain on the east coast is opposite to that on the west coast and similarly for other localities in India. So far as I can make out the effect is only indirect, as explained in the above paragraph. In consequence of a comparatively low pressure area on the east coast, the southwest monsoon on the west coast and elsewhere, in some portions depending on the localization of the low pressure area, blows stronger than usual, as in the case of 1900. It is rather difficult for me, with no records to depend on, to say with what low pressure area on the east coast the fall in some particular portion of the west coast would be heavy. Records show that during some years of high temperature in Madras the rainfall

in Mangalore, a station on the west coast almost in the same latitude as Madras, was particularly heavy.

If something like what I have attempted to do in this paper be tried for the whole of the east coast we may get interesting results.

If really the sun has something to do with our monsoons, we may perhaps be better able to predict about their strength, now that a solar physics observatory has recently been established in our midst at Kodaikanal.

A DARK DAY IN WASHINGTON.

By Rev. M. EELLS, Voluntary Observer, Mason County, Wash., dated October 15, 1902.

Friday, September 12, 1902, was the darkest day that the oldest inhabitant of Hood Canal, in western Washington, ever knew here, owing largely to the smoke from heavy fires in western Washington and western Oregon. At Twana, in Mason County, it appeared as follows: The evening before was somewhat smoky, though not peculiarly so, with a few ashes occasionally falling. About 3 o'clock on the morning of the 12th the whole heavens were a very bright red, according to the statement of a young lady who waked up, as she supposed, about that time, the light being similar in appearance to a certain kind of northern lights only it covered the whole heavens. By 5:30 a. m., when the writer first looked out, it had faded to a dull red. By 7 a. m. the reddish appearance had disappeared, it having turned to a gray color. At 9 a. m. it was possible to read in the house only by getting near a window, and even then it was quite trying to the eyes. By 11:30 a. m. the dull reddish color appeared all around, soon growing very bright in the north, but by 12:30 p. m. the brightest red was in the south. Between 12 noon and 1 p. m. was the darkest part of the day, it being utterly impossible to read out of doors. After 1 p. m. it began to lighten a little, the chickens, which had gone to roost, began to crow; 1:15 p. m. it was again possible to read out doors; at 2 p. m. there was considerable dull red in the sky, but it then disappeared to be seen no more, the heavens becoming again of grayish color. After 3 p. m. was the brightest part of the day.

There were four noticeable peculiarities about the smoke. One was the reddish color above mentioned, another the fact that the smoke did not seem to make the eyes smart, a third that the smoke did not have even the bluish color that dense smoke generally has, and the fourth that any light seen at a distance of twenty or more yards, whether coming from a lamp or a brush fire, was exceedingly white, in fact, very similar to an electric light, and the blaze from a brush fire rose up very slim and tall.

Mr. W. A. Hunter and wife started for their home on the upper Skokomish, 6 miles west of Twana, from the Canal Logging Company's camp, a mile distant, about noon. The road led through the heavy timber but they found it so dark that although Mr. Hunter tried to get along, he found it impossible to drive a team over the road without a lantern, so one was borrowed, which Mrs. Hunter carried, walking ahead, while Mr. Hunter drove the team behind. It was as dark in that timber, Mr. Hunter said, at noon as the darkest night he had ever seen.

The next day the atmosphere returned to its normal condition, and while it was very smoky, so as to make a person's eyes smart considerably, yet it was light enough to read anywhere in the house. The sun was not visible on the 12th.

The darkness seems to have traveled like a wave northward. At Astoria, Oreg., about seventy-five miles to the south, the darkness began on the 11th, so that it was necessary to have lights at 3 p. m. The sky was of a yellowish green and fog from the ocean was said to have mixed with the smoke. At Olympia, 30 miles southeast of Twana, on the 12th, it was darkest about 10 a. m. At Shelton, 10 miles south of Twana, there was considerable yellow mingled with the reddish appearance. Ten miles west of Twana, in the Olympian Mountains, the red appearance continued all day, though toward evening it was somewhat greenish; the brush fires not only had a tall, slim blaze, but were of a greenish color, as if some kind of a gas were burning. At Brinnon, 30 miles north of Twana, the sun was barely visible as a red ball in the morning, and it was not necessary to use lights in the houses until about 3 p. m., while at Twana they were used all day in most houses.

On the eastern part of Puget Sound, at Tacoma and Seattle, the darkness was very marked, but not so much so as on the western side at the base of the Olympian Mountains.

What caused the reddish appearance has not been satisfactorily explained. Some attributed it to the light from the fires, but this does not seem possible. The writer attributed it to the sun's rays working through the darkness, until he learned that the brightest red was seen about 3 a. m. There certainly seems to have been a very peculiar state of the atmosphere that day, which can only be explained by wiser meteorologists than the writer, but the day will be remembered as one in a lifetime.

INDIAN SUMMER.

A letter from W. M. Wilson, Section Director, Milwaukee, Wis., says:

Referring to your favor of recent date in regard to Indian Summer, I beg to enclose herewith the result of the examination of our records by Mr. J. W. Schaeffer, Observer, Weather Bureau.

After going through the records, Mr. Schaeffer is of the opinion that the conditions which are popularly regarded as belonging to Indian Summer obtain quite as frequently in other seasons as during the autumn months.

If you can suggest some better method of tabulating the data or desire a more complete statement I will be glad to have it done.

These periods relate to the seasons ordinarily designated in meteorologies as the mild, dry period, characterized by a hazy and smoky condition of the atmosphere, and occurring at the ending of October and the beginning of November.

The records at this office show that these periods do not occur with any regularity in the successive seasons, and in some years do not occur at all.

1872, Indian Summer set in apparently on September 30, with a hazy and smoky condition; lowest preceding temperature, 40°, on September 27; continued till October 28; cirrus clouds prevailing; rain, 0.56 inches; winds, from calm to 32 miles, generally, however, light from calm to 12 miles; variable, but mainly northwest; highest barometer, 30.49, on 24th; lowest, 29.44, on October 15; mean temperature, 46.7°; maximum, 75°, on 20th; minimum, 29°, on 11th; killing frost October 10; temperature, 32°; rain, 0.22 on 22d, 0.21 on 6th, and 0.13 on 22d of November. September, mean temperature, 62°; rainfall, 8.72. October, mean temperature, 47°; rainfall, 0.73. November, mean temperature, 30°; rainfall, 1.99.

1873, from October 7 to 25 hazy and smoky condition; lowest preceding temperature, 36°, on 6th; cirrus and upper cumulus clouds prevailing; rain, 0.06 on 16th, 0.72 on 17th, 0.01 on 21st, and 0.01 on 22d; winds, from calm to 10 miles, mainly southerly and southwest; highest barometer, 30.48, on 25th; lowest, 29.53, on 21st; minimum temperature, 26°, on 23d; maximum, 75°, on 15th; mean, 49°; evidently killing frost occurred on the 22d. Mean temperature for September, 60°; rainfall, 2.89; mean temperature for October, 46°; rainfall, 1.96; mean temperature for November, 30°; rainfall, 1.72.

1874, evidently beginning September 28 and ending October 25. Clear, hazy and smoky weather predominating, but stratus clouds frequently occurring; rain, 0.11 on 5th, 0.07 on 10th; winds, 2 to 26 miles, generally averaging 10 miles, mainly northwest to southwest, few easterly; maximum barometer, 30.56, on 13th; lowest barometer on 1st, 29.54; mean temperature for the period, 54.4°; maximum, 78°, on 20th; minimum, 28°, on 13th; killing frost on the 12th; mean temperature for September, 65°; rainfall, 4.51; mean temperature for October, 50°; rainfall, 1.90; mean temperature for November, 35°; rainfall, 2.69.

1875, from October 18 to 24, haze on all days; lowest preceding temperature, 29°, on September 27; killing frost; no clouds; no rain; winds southwest, from 5 to 20 miles; highest barometer, 30.16, on 18th; lowest on 23d, 29.68; mean temperature, 48.8°; maximum, 78°; minimum, 33°. Here are six days only that can be called Indian Summer, such periods are common to all months of the year. September, mean temperature, 57°; rainfall, 4.31. October, mean temperature, 44°; rainfall, 2.37. November, mean temperature, 31; rainfall, 1.16.

1876, from October 1 to 28, light haze and smoke occurred on six days

only; lowest preceding temperature, 32°, on September 30; weather generally cloudy, very few clear days; rain, 0.38 on 5th, 0.07 on 13th, 0.43 on 19th, 0.54 on 20th; highest barometer, 30.48, on 15th; lowest on 5th, 29.33; mean temperature for the period, 44°; maximum, 68°, on 2d; minimum, 23°, on 15th. Practically no conditions of Indian Summer. September, mean temperature, 58°; rainfall, 3.66. October, mean temperature, 44°; rainfall, 1.62. November, mean temperature, 35°; rainfall, 3.57.

1877, four days of haze and smoke; lowest preceding temperature, 33°, on October 5; few clouds; no rain; winds southwest, from 4 to 20 miles; barometer about normal; mean temperature, 52°; no conditions of Indian Summer. September, mean temperature, 63°; rainfall, 0.48. October, mean temperature, 50°; rainfall, 7.15. November, mean temperature, 35°; rainfall, 4.95.

1878, practically no period without rain; none of haze or smoke; no distinguishing periods to suggest the possibility of Indian Summer. September, mean temperature, 63°; rainfall, 4.03. October, mean temperature, 49°; rainfall, 4.13. November, mean temperature, 41°; rainfall, 1.01.

1879, from October 19 to November 1, generally clear, smoke and haze to some extent, not marked; rain, 0.03, on 27th; trace of snow on November 1; lowest preceding temperature, 30°, on September 24, evidently killing frost; highest barometer, 30.60, on 25th; lowest, 29.63, on 27th. Mean temperature, 43°; maximum, 68°, on 22d; minimum, 17°, on November 1.

1880, from October 1 to 15, generally clear, haze and smoke prevailed; rain, 0.01 on 3d, 0.20 on 14th; lowest preceding temperature, 35°, on September 30; killing frost on October 18, or temperature of 30°. Mean temperature, 56.8°; maximum, 77°, on 10th; minimum, 38°, on 13th; winds averaging 16 miles, and southwest to northwest; highest barometer, 30.46, on 12th; lowest, 29.60, on 14th. September, mean temperature, 60°; rainfall, 1.85. October, mean temperature, 48°; rainfall, 0.51. November, mean temperature, 27°; rainfall, 0.82.

1881, no period of haze or smoke; rain abundant in October, light and scattered in November; 2 clear days in October, 6 clear in November. September, mean temperature, 64°; rainfall, 4.28. October, mean temperature, 52°; rainfall, 6.04. November, mean temperature, 37°; rainfall, 1.69.

1882, no conditions of Indian Summer; from October 17 to 27 no rain fell; dense haze on the 21st; wind, average 16 miles, south prevailing. September, mean temperature, 63°; rainfall, 1.31; October, mean temperature, 56°; rainfall, 2.83, November, mean temperature, 40°; rainfall, 2.05.

1883, ice formed October 20; temperature gradually increased till November 11; snow on the 14th; heat lightning on the 20th; thunderstorm on the 26th; very few records of light haze and smoke; maximum temperature of the period, 60.5°, November 5; minimum, 24°, on November 11; northerly winds predominated, the last of October averaging 12 miles, and to November 20 mainly northwest and southwest, averaging 15 miles; highest barometer, 30.50, October 20; lowest, 29.46, October 29; haze on the 19th and 21st; total rain in October, 0,52; in November, 1.34. September, mean temperature, 57°; rainfall, 2.32; October mean temperature, 49°; rainfall, 1.92; November, mean temperature, 35; rainfall, 1.81.

1884, from October 9 to November 23, or from the first killing frost to the ending of the high mean temperature, light haze recorded in ten instances; maximum temperature of the period, 74°, October 20; minimum, 25.6°, November 26; highest barometer, 30.52, October 14; lowest, 29.55, November 22; winds, southwest and averaging 16 miles; total rain of October period, 0.61, and of November, 1.35. September, mean temperature, 64°; rainfall, 2.82; October, mean temperature, 53°; rainfall, 2,18; November, mean temperature, 35°; rainfall, 1.45.

1885, after killing frost on October 21, no mention made of haze as occurring in October or November; rain October 24, 0.27 and on 31st, 0.28; maximum temperature, 69.5°, on the 26th of October; minimum, 22.5°, November 16; highest barometer, 30.34, November 27; lowest, 29.49, on the 11th; wind, westerly and averaging 12 miles. September, mean temperature, 60°; rain, 3.30; October, mean temperature, 46°; rain, 2.40; November, mean temperature, 38°; rain, 1.53.

1886, dry period beginning October 25, ending practically on November 15; rain on the 2d, 3d, 9th, and 10, and snow on the 6th; total, 0.28 inch; no haze recorded; lowest preceding temperature, 31°, October 2; highest barometer, 30.56, October 26; lowest, 29.69, November 2; temperature shows a gradual decrease; maximum, 69.4°, October 31; minimum, 15.4°, November 19; winds, southwest in October and west in November. September, mean temperature, 61°; rain, 2.38; October, mean temperature, 53°; rain, 2.31; November, mean temperature, 34°; rain, 1.62.

1887, dry period began October 24, ended November 17; rain, 0.01, on the 29th October and 0.32, on November 9; light haze October 25 and November 7; lowest preceding temperature, 24.5°, October 22; maximum temperature of period, 68.7°, November 6; minimum, 14.8°, on November 25; first killing frost, October 8; thunderstorms, 2d, 5th, 6th, and 7th of October; highest barometer, 30.53, on October 25; lowest, 29.19, on 19th of November; prevailing wind, southwest and west, averaging 16 miles. September, mean temperature, 60°; rain, 4.36; October, mean temperature, 46°; rain, 2.43; November, mean temperature, 36°; rain, 0.85 inch.

1888, killing frost October 3; dry period from November 11 to 27; no record of haze or smoke; temperature shows gradual decrease; maximum, 59°, on 14th; minimum, 14°, on 17th; winds, light and mainly northwest, averaging 7 miles; highest barometer, 30.68, on the 20th; lowest, 29.90, on the 15th; first snow, November 10. September, mean temperature, 57°; rain, 0.99; October, mean temperature, 46°; rain, 1.18; November, mean temperature, 39°; rain, 1.46.

1889, September 27, killing frost; first snow October 6, 0.01 inch; from October 1 to 31, 0.56 rain only; maximum temperature, 74°, on 11th; minimum, 31°, on 21st; lowest preceding temperature, 34°, on September 27; light haze recorded on 3d, 13th, and 18th; average wind, 11 miles; prevailing, 27 per cent, north; highest barometer, 30.52, on 23d; lowest, 29.62, on 25th. September, mean temperature, 60°; rain, 3.45; October, mean temperature, 47°; rain, 0.56°; November, mean temperature, 36°; rain, 2.71.

1890, short, dry period from November 18 to 29th; killing frost October 20th; no haze nor smoke recorded; temperature, normal for October; November temperature about normal; few traces of rain.

1891, October 18 to November 7, dry, smoky and hazy; killing frost October 16th; temperature, 30°; maximum temperature, 70°, on 29th of October; minimum, 27°, on November 3; rain, 0.01, on October 26; highest barometer, 30.50 November 2; lowest, 29.85 November 5; winds, mainly southwest, averaging 10 miles. September, mean temperature, 67°; rain, 0.18. October, mean temperature, 51°; rain, 1.66. November, mean temperature, 33°; rain, 3.40.

1892, from October 3 to 30, inclusive, light haze on 9th; rain, 0.14, on 15th, and 0.04 on 18th; mean temperature of period, 52°; maximum, 74°, on 3d and 15th; minimum, 29°, on 30th; highest barometer, 30.33, on 30th; lowest, 29.56, on 7th; average wind velocity, 9 miles west and northwest; total rainfall, 1.66; mean temperature, 52.2°. September mean, 62°; rainfall, 2.21. November mean, 33°; rain, 1.84.

1893, November 3 to 20, inclusive; 0.12 inch rain on 12th; no record of haze or smoke; dense fog 6th, 8th, 9th, 10th, and 11th; average wind, 10 miles, mainly westerly; highest barometer, 30.25, on 11th; lowest, 29.70, on 16th; maximum temperature, 67.6°, November 16th; minimum, 16°, on the 18th; average temperature for the period, 39°; for the month, 35°; total rain for the month, 1.20. September mean temperature, 62°; rain, 3.24. For October, mean temperature, 50°; rain, 1.62.

1894, dry period from November 14 to December 6, inclusive; mean temperature, 31°, about normal for the month of November; maximum, 50°, on the 19th; minimum, 6°, on 19th; highest barometer, 30.71, on November 28; lowest, 29.45, on November 15; no mention of haze or smoke; dense fog on 22d and 30th, also December 1; average wind, 11 miles, westerly and northwest; killing frost on September 25th; total rain, 1.69; 0.10 snow on 28th.

1895, practically entire month of October dry; total rain, 0.52 inch, 2.03 below the normal; temperature, 5° below the normal; traces of snow occurred; maximum temperature, 74°, on the 2d; minimum, 20°, on the 30th; killing frost on the 30th of September; highest barometer, 30.51, on the 30th; lowest, 29.59, on the 26th; Dense smoke mentioned on the 25th and 30th only; no haze recorded; westerly winds, averaging 11 miles. September, mean temperature, 66°; rain, 1.82. October mean, 45°; rain, 0.52. November, mean temperature, 34°; rain, 2.77.

1896, October 1 to 31, inclusive; snow on the 17th and 19th, 0.46 melted; total for the month, 1.02 or 1.32 below the normal; slightly hazy on 7th and 13th; normal temperature, 49.3°; about normal for Nevember; mean for the month, 46.9; highest barometer, 30.41, on 8th; lowest, 29.50, on 30th; killing frost October 18; winds, northerly, average, 9.4. September, mean temperature, 58°; rain, 5.72. October, mean temperature, 47°; rain, 1.02. November, mean temperature, 36°; rain, 2.48.

1897, October 1 to 11, inclusive; total rain, 1.05; no snow; maximum temperature, 88°; minimum, 34°; mean, 56.1° or 7° above the normal; highest barometer, 30.50, on 17th; lowest, 29.43, on 11th; winds, southeast, 9.6 average; no haze, except on one date. September, mean temperature, 67°; rainfall, 1.48. October, mean temperature, 56°; rainfall, 1.05. November, mean temperature, 36°; rainfall, 1.87.

1898, Indian Summer evidently did not occur; entire month of October rainy; amount 4.38 or 2.04 above the normal; mean temperature equals the normal; light and scattered rains in November; no period free from showers; temperature of November slightly above the normal; light haze recorded on the 9th and 23d of November. September mean, 65°; rain, 1.98. October mean, 49°; rain, 4.38.

1899, no haze recorded; rain throughout the month of October light and regular although deficient, 1.13 below the normal. The temperature is, however, 7° above the normal; first twelve days of November comparatively dry, entire rain of period, 0.15; one inch of snow on the 2d. No haze or smoke recorded. Mean temperature about normal, or 43°. September, mean, 61°; rain, 3.04; October, mean, 56°; rain, 1.21; November, mean, 44°; rain, 1.61.

1900, from October 7 to 28, inclusive, rain 0.36 only. Total fall for the month, 2.22, slightly below the normal. Temperature for this period slightly below the normal, while for the month it is considerably above the normal. No haze recorded. Winds westerly and averaging 9.8 miles. September mean temperature, 65°; rain, 3.51; November mean temperature, 36°; rainfall, 2.25.

The complete records at this office show that haze and smoke occur in all months, and much oftener in summer than in autumn.

As a general occurrence after rains, the temperature falls temporarily and then gradually increases till the next rainfall.

There is a gradual decrease of temperature during September, October, and November; when the winds increase in velocity and rains occur the temperature falls rapidly and may produce killing frosts or even a trace of snow; then follows a general rise to the normal. Now, if a dry period sets in, the air becomes filled with dust, smoke, etc., which produce a hazy condition; but if in this period a light rain occurs the air will become clear and pure as before.

If rain falls throughout the entire period, these conditions are entirely lacking.

A gradual increase of temperature occurs usually in May. After a dry, warm period, a rain occurs, and the temperature falls sufficiently low for frost to form. This period, which Hon. J. R. Sage has so happily termed the "May Dip," occurs with much more regularity as regards time than the fall period.

Years in which the Indian Summer conditions were marked: 1873, 1874, 1880, 1884, 1886, 1887, 1891, 1892, 1895.

Years in which the conditions were slightly marked: 1872, 1875, 1876, 1879, 1883, 1885, 1888, 1889, 1890, 1896, 1897, 1900.

Years in which the conditions were entirely lacking: 1877, 1878, 1881, 1882, 1893, 1894, 1898, 1899.

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

OBSERVATIONS AT HONOLULU.

The station is at 21° 18′ N., 157° 50′ W. It is the Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.

Hawaiian standard time is $10^h\ 30^m$ slow of Greenwich time. Honolulu local mean time is $10^h\ 31^m$ slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Meteorological Observations at Honolulu, September, 1902.

Date.	Pressure at sea level.	Temperature. Dry bulb.	Temperature. Wet bulb.	During twenty-four hours preceding 1 p. m. Greenwich time, or 1:30 a. m. Honolulu time. Temperature. Maximum.	Temperature. Minimum.	Means. Dew-point.	Means. Relative humidity.	Wind. Prevailing direction.	Wind. Force.	Average cloudiness.	Sea-level pressures. Maximum.	Sea-level pressures. Minimum.	Total rainfall at 9 a. m., local time.
	*	†	†			‡	‡		§				
1	29.97	75	69	82	73	64.5	65	ne.	5	5	30.03	29.94	0.02
2	29.91	75	71	83	72	65.7	68	ne.	5-4	5	30.01	29.90	0.10
3	29.91	74	71.5	83	73	71.5	83	ne.	3	7	29.97	29.88	0.14
4	29.99	73	70.5	85	73	69.5	75	nne.	3-0	3	30.01	29.89	0.00
5	29.95	77	71	85	71	68.3	73	ne.	1-3	2	30.01	29.94	0.01
6	29.95	76	69	84	74	67.3	69	ne.	3	5-2	29.98	29.89	0.01
7	29.99	76	70	84	74	66.5	69	ne.	3	5	30.03	29.94	0.01
8	29.99	76	69.5	84	74	66.7	70	ne.	3-1	3	30.05	29.97	0.01
9	29.98	75	69	83	73	66.7	72	ne.	3-4	3-5	30.03	29.96	0.27
10	29.89	75	69.5	82	71	66.5	71	nne.	3-0	5	30.01	29.89	0.06
11	29.90	72	69.5	82	71	68.0	77	ne.	2-0	7-1	29.96	29.85	0.25
12	29.95	68	67	84	69	70.0	81	s.	0-1	3	29.99	29.90	0.00
13	29.94	70	68.7	85	68	69.7	82	sw.	1-0	3-0	30.00	29.93	0.00
14	29.96	70	68.7	83	68	69.3	81	sw-nw.	1-0	3	30.00	29.90	0.00
15	29.94	70	68.7	83	69	69.5	78	sw.	1-0	4	30.02	29.93	0.00
16	29.95	71	69	86	69	69.7	80	n-se.	1-0	4-1	30.00	29.89	0.00
17	29.91	70	68.7	84	71	68.7	76	w.	1-0	3-10	29.96	29.88	0.00
18	29.90	69	67.8	85	69	69.7	80	se-ne.	1-0	4	29.98	29.88	0.01
19	29.93	68	67.5	83	69	69.3	87	se-ne.	1-0	0-8	29.97	29.90	0.17
20	29.83	69	68.3	83	67	69.7	85	se-ne.	1-0	1-9	29.93	29.83	0.51
21	29.84	73	70	82	68	70.0	83	se.	1-0	0-3	29.86	29.79	0.01
22	29.95	77	71.5	84	70	70.5	79	s-e.	1-0	2-10	29.99	29.89	0.27
23	29.99	77	69.5	84	73	68.7	72	ne.	3	5	30.04	29.95	0.10
24	29.96	76	68.5	83	75	65.7	66	ne.	4	4	30.04	29.94	0.01
25	29.98	76	68.5	83	75	65.5	65	ne.	4	3	30.00	29.91	0.01
26	29.99	75	69	83	75	65.0	64	ne.	4	3	30.01	29.92	0.02
27	29.98	76	68	83	74	65.5	67	ne.	4	2	30.06	29.93	0.00
28	29.94	76	69.5	82	75	65.0	65	nne.	4-3	2	30.01	29.91	0.02
29	29.93	75	69	83	75	68.3	76	ne.	3-1	3	29.98	29.90	0.23
30	29.91	73	69	82	72	67.7	74	ne.	2-0	6	29.99	29.89	0.03
31													
Sums													2.27
Means	29.950	73.4	69.2	83.5	71.6	68.0	74.7		1-9	3.9	29.997	29.904	
Departure	—.022					+2.5	+6.0			—0.1			+0.29

Mean temperature for September, 1902, $(6+2+9+3)\div 4 = 77.2$; normal is 77.3. Mean pressure for September, 1902, $(9+3+2)\div 3 = 29.946$; normal is 29.968.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of $(6+9+2+9)\div 4$. § Beaufort scale.

Rainfall data for September, 1902.

Stations.	Elevation.	Amount.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Hilo (town)	100	10.15
Pepeekeo	100	12.25
Hakalau	200	15.03
Honohina	300	13.01
Puuohua	.....	19.54
Laupahoehoe	500	11.26
Ookala	400	9.38
HAMAKUA, ne.		
Kukaiau	250	8.34
Paauilo	750	6.30
Paauhau (Mill)	300	5.30
Honokaa (Muir)	425	6.00
Kukuihaele	700	5.12
KOHALA, n.		
Niulii	200	5.37
Kohala (Mission)	521	4.63
Kohala (Sugar Co.)	235	4.90
Hawi Mill	600	4.48
Puuhue Ranch	1,847	2.99
Waimea	2,720	2.66
KONA, w.		
Holualoa	1,350	10.27
Kealakekua	1,580	9.18
Napoopoo	25	5.11
KAU, se.		
Kahuku Ranch	1,680	3.85
Honuapo	15	3.82
Naalehu	650	2.79
Hilea	310	2.30
Pahala	850	3.31
Moaula	1,700	4.85
PUNA, e.		
Volcano House	4,000	5.00
Olaa, Mountain View	1,690	13.86
Kapoho	110	10.80
MAUI.		
Kaupo (Mokulau), s.	285	6.91
Kipahulu, s	300	7.74
Nahiku, ne	800	13.31
Haiku, n	700	2.74
Kula (Erehwon), n	4,500	5.61
Kula (Waiakoa), n	2,700	2.28
Puuomalei, n	1,460	3.35
Paia	180	1.40
Wailuku, ne	200	1.07
OAHU.		
Punahou (W. R.), sw	47	2.27
Kulaokahua (Castle), sw	50	1.83
U. S. Naval Station, sw	6	1.39
Makiki Reservoir	120	3.23
Kapiolani Park, sw	10	0.82
Manoa (Woodlawn Dairy), e.	285	6.48
Manoa (Rhodes Gardens)	300	10.04
School street (Bishop), sw	50	2.44
Insane Asylum, sw	30	1.83
Kalihi-Uka, sw	260	6.22
Nuuanu (W. W. Hall), sw	50	2.36
Nuuanu (Wyllie street)	250	3.62
Nuuanu (Elec. Station), sw	405	5.22
Nuuanu (Luakaha), e.	850	10.02
Waimanalo, ne	25	1.53
Maunawili, ne	300	6.74
Kaneohe	100	5.46
Ahuimanu, ne	350	9.37
Kahuku, n	25	5.48
Ewa Plantation, s.	60	1.04
Waipahu	200	0.59
U. S. Experiment Station	350	2.84
U. S. Magnetic station	50	0.72
Nahuina (Laniakea)	1,150	7.68
Tantalus Heights	1,360	6.93
KAUAI.		
Lihue (Grove Farm), e.	200	2.12
Lihue (Molokoa), e.	300	3.12
Lihue (Kukaua), e.	1,000	7.77
Kealia, e.	15	1.48
Kilauea, ne	325	2.31
Hanalei, n	10	3.59
Eleele, s	200	0.78
Wahiawa Mountain, s	2,100	10.20
McBryde (Residence)	850	3.81
Lawai	15	4.04
East Lawai	800	3.68
West Lawai	200	2.76
Delayed August reports.		
Waiawa	.....	0.00
Pahala	.....	2.14
Honokaa (1,100)	.....	16.59
Wyllie street	.....	4.42
Tantalus Heights	.....	9.39
Paia	.....	2.19

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

GENERAL SUMMARY FOR SEPTEMBER, 1902.

Honolulu.—Temperature mean for the month, 77.2°; normal, 77.3°; average daily maximum, 83.5°; average daily minimum, 71.6°; mean daily range, 11.9°; greatest daily range, 17°; least daily range, 7°; highest temperature, 86°; lowest, 67°.

Barometer average, 29.946; normal, 29.968; highest, 30.06, 26th; lowest, 29.79, 20th; greatest 24-hour change, that is, from any given hour on one day to the same hour on the next, .11; lows passed this point on the 10th, 20th and 30th; highs on the 7th, 14th and 26th. The barometer has been below the normal since the month of May; the average for the nine months of this year is also low.

Relative humidity average, 74.7 per cent; normal, 68.5 per cent; mean dew-point, 68°; normal, 66°; mean absolute moisture, 7.51 grains per cubic foot; normal, 7 grains; dewy mornings continuously, 11th to 21st.

Rainfall, 2.27 inches; normal, 1.98 inches; rain record days, 22; normal, 18; greatest rainfall in one day, 0.51, on the 20th; total at Luakaha, 10.02 inches; normal, 10.21 inches; total at Kapiolani Park, 0.82 inch; normal, 0.38 inch.

The artesian well level fell during the month from 33.10 to 32.95 feet above mean sea level. September 30, 1901, it stood at 33.20. The average daily mean sea level for the month was 9.68 feet, the assumed annual mean being 10.00 feet above datum. For September, 1901, it was 10.46. Trade wind days, 19 (3 of north-northeast); normal 26. Average force of wind during daylight, Beaufort scale, 1.9. Average cloudiness, tenths of sky, 3.07; normal, 4.0.

Approximate percentages of district rainfall as compared with normal: Hilo, 160 per cent; Hamakua, 300 per cent; Kohala, 165 per cent; Waimea (Hawaii), 200 per cent; Kona, 125 per cent; Kau, 200 per cent; Puna, 190 per cent; Maui, 175 per

cent; Oahu, 125 per cent, excepting Kahuku, 270 per cent; North Kauai, 60 per cent; South Kauai, 125 per cent. The rains were quite evenly distributed through the month.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, mean maximum, 81.3°; mean minimum, 71.6°; Waimea, Hawaii, 2,730 elevation, 81.6° and 64.7°; Kohala, 521 elevation, 80.8° and 68.4°; Waiakoa, Kula, Maui, 2,700 elevation, 81.8° and 62.0°; Ewa Mill, 50 elevation, 86.0° and 69.8°; United States Experiment Station, 85.9° and 71.4°; United States Magnetic Station (near Ewa), 50 elevation, 89.8° and 69.8°; W. R. Castle, Honolulu, 50 elevation, highest, 86°; lowest, 68°; mean, 77.1°.

Ewa Mill mean dew-point, 66.4°; mean relative humidity, 68.2 per cent; United States Magnetic Station, 67.7° and 68.0 per cent; Kohala, Dr. B. D. Bond, 68.5° and 84.0 per cent.

Earthquakes reported: Pepeekeo, 24th, 9:30 p. m., and Hilo, 28th, 6:13 a. m., smart shock, "severest in six years;" Kealakekua, 19th, 5:30 p. m.; Waimea, 26th evening, 27th evening, and the morning of the 28th. During the first half of the month the molten lava disappeared from the pit in Kilauea; on the 16th active again and rising, light visible at 30 miles distance. The glows brighter than in August.

Light fall of snow on Mauna Kea, 20th. No electric storms noted. Heavy surf, 1st to 4th, and 27th. Tidal wave on Puna coast, southeast Hawaii, on 2d. Calm weather 10th to 21st, without trades.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. When the author of an article is not known the title is preceded by a ——.

Scientific American. New York. Vol. 87.

—— Temperature and Humidity Regulators. P. 201.

Collins, Frederick. Some New Detectors for Wireless Telegraphy. Pp. 220–221.

Hall, Alfred E. Curious effect of Lightning on a Brick Chimney. P. 336.

Fyfe, H. C. Experiments at St. Catherine's with Fog Signals. P. 240.

—— Commercial Utilization of Atmospheric Elements. Pp. 254–255.

Scientific American Supplement. New York. Vol. 54.

Dewar, James. History of Cold and the Absolute Zero. Pp. 22386–22387; 22370–22371; 22406–22407.

—— Cold Weather and Belated Crops in Germany. P. 22412.

Mott, S. D. Aerodromes. Pp. 22416–22420.

Philosophical Magazine. London. 6th series. Vol. 4.

Everett, J. D. On the Comparison of Vapour-Temperatures at Equal Pressures. Pp. 335–338.

Edser, Edwin. The Diffraction of Light from a dense to a Rarer Medium, when the Angle of Incidence exceeds its Critical Value. Pp. 346–352.

Thomson, J. J. Experiments on Induced-Radioactivity in Air, and on the Electrical Conductivity produced in Gases when they pass through Water. Pp. 352–367.

Wood, R. W. On the Electrical Resonance of Metal Particles for Light-Waves. Pp. 425–430.

Stevenson, John. The Chemical and Geological History of the Atmosphere. Pp. 435–451.

Nature. London. Vol. 66.

Nutting, P. G. The effect of Light on Cyanin. P. 416.

—— Sea Temperature Variations on the British Coasts. Pp. 452–453.

—— Snow-waves and Snow-drifts. Pp. 453–454.

—— The Upper Air and Auroras. Pp. 474–476.

Sherborn, C. Davies. Effect of a Lightning Flash. P. 492.

—— Convention of Weather Bureau Officials. Pp. 543–454.

Terrestrial Magnetism. Baltimore. Vol. 7.

Nippoldt, A. Ueber die meteorologische Natur der Variationen des Erdmagnetismus. Pp. 101–114.

Beattie, J. C. Work in Terrestrial Magnetism and Atmospheric Electricity in South Africa. Pp. 114–115.

Geographical Journal. London. Vol. 20.

Andersson, J. Gunnar. The Winter Expedition of the "Antarctic" to South Georgia. Pp. 405–408.

—— The Arctic Expeditions—Return of Sverdrup, Peary, and Baldwin. Pp. 434–438.

—— The Scottish National Antarctic Expedition. Pp. 438–440.

Journal of Geography. Lancaster. Vol. 1.

Chamberlin, J. F. Climatic Conditions in Southern California. Pp. 297–303.

Ward, R. DeC. Relative Humidity of our Houses in Winter. Pp. 310–317.

Scottish Geographical Magazine. Edinburg. Vol. 18.

Bruce, W. S. Scottish National Antarctic Expedition. Pp. 536–543.

American Inventor. Washington. Vol. 9.

McAdie, Alex. C. Fog Studies. Pp. 209–214.

Astrophysical Journal. Chicago. Vol. 16.

Very, Frank W. The Absorptive Power of the Solar Atmosphere. Pp. 73–92.

Peters, G. H. Some results of the Total Eclipse in Sumatra of May 18, 1901, obtained with the Photoheliograph at Fort de Kock. Pp. 92–97.

Symons's Meteorological Magazine. London. Vol. 37.

Lockyer, Norman, and Lockyer, William J. S. A Short Period of Solar and Meteorological Changes. Pp. 120–122.

—— An African Rainmaker. Pp. 122–124.

Proceedings of the Royal Society. London. Vol. 70.

Travers, Morris W.; Senter, George; and Jacquerod, Adrien. On the Measurement of Temperature. Pp. 484–491.

Aeronautical Journal. London. Vol. 6.

Bacon, John M. Balloon Ascents in Thunderstorms. Pp. 62–65.

—— The St. Louis Airship Competition. P. 68.

Ciel et Terre. Bruxelles. 24me Année.

W., P. Notes sur les éruptions du mont Pelé. Pp. 374–382.

Revue Scientifique. Paris. 4me séries. Tome 18.

B., L. La météorologie des États-Unis en 1901. Pp. 400–401.

Annuaire de la Société Météorologique de France. Paris. 50me Année.

Raulin, V. Les régimes pluviométriques saisonnaux des Iles Britanniques. Pp. 129–139.

Maillet, Edmond. Résumé des observations centralisées par le Service Hydrométrique du Bassin de la Seine pendant l'année 1900. Pp. 145–168.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 135.

Janssen, J. Sur les travaux de cette année, à l'observatoire du sommet du mont Blanc. Pp. 341–343.

Jodin, Victor. Sur la durée germinative des graines exposées à la lumière solaire. Pp. 443–444.

Deslandres, H. Organisation, à l'Observatoire de Meudon, des spectrographes automatiques dits des vitesses, qui enregistrent les mouvements radiaux et l'épaisseur de la chromosphère solaire. Pp. 500–503.

Guillaume, J. Observations du soleil faites à l'Observatoire de Lyon pendant le premier trimestre de 1902. Pp. 523–525.

La Nature. Paris. 30me Année.

Perand, H. Nouveau composé volatil dans l'air atmosphérique. P. 198.

Corbigny, Brossard de. Cerf-volant porte-amarres de sauvetage et de sport. Pp. 219–222.

Archives des Sciences Physiques et Naturelles. Genève. 4me séries. Tome 14.

Rabot, Charles. Essai de chronologie des variations des glaciers. Pp. 133–150.

Meteorologische Zeitschrift. Wien. Band 19.

Sprung, A. Photographische Aufnahmen des Sonnenring-Phänomens vom 13 März 1902, zu Potsdam. Pp. 345–348.

Goeldi, E. A. Zum Klima von Pará. Pp. 348–366.

Hergesell, G. Vorläufiger Bericht über die internationale Ballonfahrt vom 6 März 1902. Pp. 366–367.

—— Täglicher Gang der meteorologischen Elemente am Observatorium auf Mauritius. P. 367.

—— Täglicher Gang des Luftdrucks und der Temperatur zu Rosario, Argentinien. Pp. 367–369.

MacDowall, Alex. B. Mond und Wetter. Pp. 369–370.

Maurer, J. Meteorologische Station St. Gotthard-Hospiz. Pp. 370–371.

—— Der Mai 1902. P. 371.

Fényi, J. Ueber den Gewitterregistrator in einer neuen sehr einfachen Form. Pp. 371–372.

Kossatsch, M. Ueber eine Lücke in den Theorien der Wärme und der Temperaturänderungen im Boden. Pp. 272–273.

—— Ueber die normale Vertheilung der magnetischen Deklination und Inklination in Frankreich. Pp. 373–374.

—— Gewitter und Hagel im Department de l'Herault 1875–1899. P. 374.

—— Sonnenscheindauer zu Montpellier. P. 374.

—— Resultate der meteorologischen Beobachtungen auf dem Ben Nevis im Jahre 1900. Pp. 374–375.
—— Meteorologische Beobachtungen im Glen Nevis. Pp. 375–376.
—— Einstellung der meteorologischen Beobachtungen auf dem Ben Nevis. P. 376.
—— J. R. Plumandon über die Dauer der Hagelfälle. Pp. 376–377.
Pernter, J. M. Hagel ohne elektrische Entladungen. P. 377.
—— Ameisenregen. Pp. 377–378.
Hann, J. Meteorologische Beobachtungen zu Quito. Pp. 378–381.
Neumayer, G. Forschungen auf dem Gebiete des Erdmagnetismus innerhalb der Polarregionen und deren Einfluss auf die Theorie. Pp. 381–382.
Schubert, J. Der Wärmeaustausch im festen Erdboden, in Gewässern und in der Atmosphäre. P. 382–383.
—— R. Assmann über die Existenz eines wärmeren Luftstromes in der Höhe von 10–15 km. Pp. 384–385.
—— Luftelektrische Beobachtungen. Pp. 385–386.
—— Dauer der Dämmerung in den Tropen. P. 386.
Richter, C. M. Sonnenflecken, Erdmagnetismus und Luftdruck. Pp. 386–389.
Fényi, J. Einige Ergebnisse des Pluviographen in Kalocsa (ungarisches Tiefland). Pp. 389–391.
—— Dunkelheit während des Tages in London. P. 391.
—— Ein Drache für die schottische antarktische Expedition. P. 391.

Gaea. Leipzig. 38 Jahrg.
—— Die Temperaturverhältnisse des nordatlantischen Oceans. P. 636.
—— Blitzschutzvorrichtungen für elektrische Apparate. Pp. 660–671.
—— Sonnenuntergangs-und Dämmerungserscheinungen in subtropischen und tropischen Gebieten. Pp. 671–673.
—— Tödlicher Blitzschlag in eine Schutzhütte auf den Alpen. Pp. 696–697.
—— Einfluss grösseren Kohlensäuregehaltes der Luft auf das Wachstum der Pflanzen. P. 698.

Das Wetter. Berlin. 19 Jahrgang.
Klengel, Friedrich. Meteorologisches vom Mai 1902, in Leipzig. Pp. 169–173.
Assmann, Richard. Betrachtungen über die abnorme Witterung des diesjährigen Sommers. Pp. 173–184.
Assmann, Richard. Drachenaufstieg während eines Gewitters. P. 186.
Stade, —. Gefrorener Regen. Pp. 189–190.
Assmann, Julius, Sr. Ein Blitzschlag. P. 190.
Grossmann, —. Zur Frage der Verlegung des wettertelegraphischen Dienstes auf eine frühere Stande. Pp. 193–196.
—— Die zweite Versammlung der Beamten und Mitarbeiter des Weather Bureau im August, 1901, in Milwaukee. Pp. 196–204.
Rimpau, W. Die Wirkung des Wetters auf die Zuckerrüben-Ernten der Jahre 1891 bis 1900. Pp. 206–214.
Stanhope-Eyre, A. Beobachtungen am Blitzregistrator, Observatorium Uslar. P. 214.
Treitschke, Fr. Verdunstungskälte in einem Eimer. P. 214.
Otto, —. Regenbogen-Erscheinung. Pp. 215–216.

Annalen der Hydrographie und Maritimen Meteorologie. Hamburg. 30 Jahrg.
—— Ableitung der normalen Morgen-und Nachmittagstemperaturen der deutschen Stationen für die Wetterberichte der Deutschen Seewarte. Pp. 421–427.
Burchard, O. Meteorologische Beobachtungen auf einer Winterreise nach den Canarischen Inseln. Pp. 437–449.

Petermann's Mittheilungen. Gotha. 48 Band.
Kassner, C. Die Niederschlagsverteilung in Bulgarien. Pp. 145–151.
Brückner, Eduard. Zur Frage der 35 jährigen Klimaschwankungen. Pp. 173–178.

Physikalische Zeitschrift. Leipzig. 3 Jahrgang.
Elster, J. and Geitel, H. Ueber die Radioaktivität der im Erdboden anthaltenen Luft. Pp. 574–577.

Zeitschrift für Gewasserkunde. Leipzig. 5 Band.
Walter, H. Neues analytisch-graphisches Verfahren zur Bestimmung der Stauweite. Pp. 65–105.
Hertmann, R. Beitrag zur Kenntniss der Wirbelbewung. Pp. 106–125.

Memorie della Societa degli Spettroscopisti Italiani. Catania. Vol. 31.
Bemporad, A. Sopra un nuovo sviluppo dell' integrale della estinzione atmosferica. Pp. 131–143.
Wolfer, A. La fréquence des taches solaires pendant l'année 1901. Pp. 152–155.

Memorias de la Sociedad Cientifica "Antonio Alzate." Mexico. Tome 17.
Laguerenne, Teodoro Luis. Ligeras observaciones sobre la climatologica de Mexico. Pp. 43–51.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of H. H. Cousins, chemist to the Government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

Comparative table of rainfall for September, 1902.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			Average.	1902.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	21	8.34	5.48
Northern division	22	47	5.33	3.78
West-central division	26	21	10.53	9.70
Southern division	27	32	6.35	4.73
	100	120	7.64	5.89

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope the weather continued dry until about the 15th, after which the rain was more frequent, although still scarce. In San Jose the pressure was normal, the temperature slightly above and the relative humidity under the mean. On the Atlantic slope the rainfall continued in excess at the stations at the foot of the Cordillera, while it was about normal on the coast. From Talamanca a strong hurricane is reported on the 14th, $0^h\ 30^m$ to 2^h p. m.

Notes on earthquakes.—September 9, $9^h\ 35^m$ p. m., slight shock, NE–SW, intensity II, duration 7 seconds. September 11, $11^h\ 30^m$ a. m., tremors. September 13, $2^h\ 23^m$ a. m., slight shock, NW–SE, intensity I, duration 4 seconds. September 13, $9^h\ 05^m$ a. m., very slight shock, NW–SE, intensity I, duration 4 seconds. September 25, $5^h\ 27^m$ a. m., strong shock, E–W, intensity III, duration 8 seconds. Moreover, the Tres Rios Station reports a short and slight shock on the 29th, $1^h\ 50^m$ p. m., which was neither registered nor felt in San Jose.

NOTES AND EXTRACTS.

WEATHER FIXES TRAIN LOADS.

The following is from the Pittsburg Dispatch of recent date:

There is a closer relation between the Weather Bureau and the operation of freight trains than is generally known. On the Pennsylvania lines, and in reference to train movements from Pittsburg to the West and Northwest, this is particularly the case.

Every day at noon the freight transportation department of the lines receives the weather report for the ensuing twenty-four hours from Observer Cox of Chicago. His district extends from the Rocky Mountains to the line dividing eastern Indiana from Ohio, and his standing for accuracy is such that, in the winter season particularly, the make-up of trains is arranged in accordance with Cox's reports—that is, the hauling capacity of a freight engine is decided upon on receipt of the daily bulletin. To this end four classes are arranged, designated alphabetically. The report being favorable places the engine's load in class A, or full capacity, 1,750 tons. Class B denotes a reasonably good weather report, but limits the locomotive's load to 1,625 tons. Still worse weather means a reduction of the load to 1,475 tons, or 150 tons less than class B. When Mr. Cox announces specially bad weather the order goes out for class D, which means that no engine shall leave Pittsburg for the West with more than 1,225 tons. In this way delays through storms and snowfalls and extreme low temperature are greatly lessened.

In the case of stock trains, class A is not 1,750, but 1,450 tons, and for high class freight running at higher speed than ordinary freight, this class means only 1,525 tons per train, with the same allowance for the three lower classes as is given above.

The load having been established in the office of the superintendent of freight transportation in accordance with the weather report, the order of the superintendent goes out to the trainmasters and thence to the yardmasters, who arrange the engine's load in accordance with instructions. It is doubtful if the United States Weather Bureau finds more practical application anywhere than in operating freight trains out of Pittsburg to the West.

A COMPARISON WITH THE BAROMETRIC STANDARD OF COSTA RICA.

In a letter of August 13 Mr. H. Pittier states that he had lately sent one of his assistants to Limon, Costa Rica, with a new barometer that had been carefully compared with the standard of the Physico-Geographical Institute. The mean result of ten observations taken hourly during two days (July 29 and 30) showed that the barometer at Limon read too high by 6.54 mm., and that this error had existed for several months. The instrument is an old French model with a broad cistern and Fortin's adjustment for transportation. The error was largely due to the fact that before being transferred from one room to another, several months ago, the cistern had been properly screwed up, but had not afterwards been completely screwed down. Even after the latter operation had been properly performed on July 29 by the assistant, there was still need of a correction of 0.6 mm. Consequently, the faulty barometer was brought back to Costa Rica and the other one left in its place; this latter was constructed by James Green, of New York, and left at San Jose by William Gabb, but subsequently repaired by Negretti and Zambra; its readings may be relied on.

The international comparison of the barometric standards of various European countries and the United States, executed by Prof. Frank Waldo in 1885, needs now to be renewed and extended to include all the American States. General meteorological studies require that the pressure should be known to within 0.01 inch at all important stations in the Northern and Southern Hemispheres.—*C. A.*

PHYSICS AND METEOROLOGY.

A recent letter from a correspondent says:

In the course of two or three years teaching of physical geography, etc., many questions have arisen, for some of which I have found no satisfactory or authoritative answers. I do not know whether it is your custom to answer such questions either privately or through the columns of the REVIEW, but I take the liberty of submitting the following queries:

1. What effect, if any, does the increasing density of the earth's atmosphere, near the earth's surface, have upon the amount of insolation absorbed by the atmosphere? I do not find this given in the meteorologies as a cause for unequal heating of different strata of air. I have wondered if it has any effect.

2. Ganot's Physics, page 412, says that ordinary undried, but not especially moist, air was found in a certain experiment to absorb 72 times more heat than dry air. Davis's Meteorology says that water vapor is found by experiment to be as poor an absorber as dry air. Are not these statements contradictions and which is correct? To what experiments does Davis refer?

3. Is there any clear explanation why increasing the temperature of a space increases the capacity of that space for vapor? If I understand correctly, a space becomes saturated when the vapor pressure becomes such that for every molecule of water forced into it from the evaporating surface one is forced out. When this equilibrium is attained would it not seem that raising the temperature of the vapor in the space would, by causing an increase in the vibration of the vapor molecules, cause a greater expansive force and thus prevent rather than allow more vapor to pass in? Of course experiment proves that more will pass in and can exist in the vapor state when the temperature is raised, but is there any explanation for it?

4. Can the article published in the REVIEW some time ago on the "Gulf Stream Myth" be regarded as authoritative? Of course the influence of the stream has been overestimated, but does not this article underestimate its effect? Davis seems to think the ocean currents are important enough to attribute to them the cause of the deflection of the isotherms. Is he correct in this or has he underestimated the influence of the winds?

* * * * * * *

The following replies are published as being of general interest:

1. In reply to the first question, it may be stated that the amount of heat absorbed by a layer of gas of given thickness is proportional to the thickness of the layer and its transparency; the latter depends on density and dust or haze, therefore a layer of air one foot thick absorbs more when near the earth's surface than when high up in the atmosphere. But for dustless air this amount is so small that it will not account for the unequal warmth of the different strata of air, since clean, dry air is exceedingly diathermanous.

The following quotation from Prof. F. W. Very's article on the "Solar Constant"[1] will, perhaps, elucidate this subject:

It is commonly supposed that the larger portion of the heat produced by the absorption of the solar rays remains in the lower layers of the atmosphere, because these are richest in the vapor of water and in dust. See, for example, M. Crova's Mesure de l'intensité calorifique des radiations solaires et de leur absorption par l'atmosphère terrestre, p. 1, Paris, 1876. M. Radau, Actinométrie, p. 12, says: "In proportion as the rays penetrate into the atmosphere they encounter layers more and more dense, and the loss which they experience through unit path is proportional: (1) to the actual intensity of the beam; (2) to the density of the layer which they traverse; (3) to a constant coefficient of absorption * * * which varies with the nature of the rays." On page 14 Radau says: "The absorption is due in great part to the vapor of water distributed in the lower layers of the atmosphere." Although it is recognized (page 18) from the observations of Desains that the ratio of long-wave solar radiations on a high mountain to those at sea level must diminish when the air is very moist, nevertheless no objection is made to the use of formulæ in which the aqueous component of the absorption is assumed to be proportional to the density of the aqueous vapor.

The actual case is much more complicated. Selective reflection increases in the lower atmospheric layers, but does not warm them. Low layers of a moist atmosphere become hot because they absorb the rays of extremely long wave-length emitted by the heated soil. The sun heats these layers indirectly by first heating the ground, but contributes little heat directly, since the rays absorbable by aqueous vapor have been nearly all sifted out of the sunbeam before this reaches the lower atmospheric layers. On the other hand, the higher atmosphere, which contains a smaller quantity of aqueous vapor, is the first to attack the incoming rays. It is in the upper layers that the aqueous absorption of the solar infra-red rays takes place chiefly, and these are therefore the layers which are most warmed by the direct rays of the sun. I have noted elsewhere (Atmospheric Radiation, p. 123) that after rising above the comparatively thin layer of convectionally heated air, that portion of the diurnal range of temperature due to the immediate absorption of the solar rays may be expected to increase up to nearly the limit of the aqueous atmosphere, and it is surmised that this variation may possibly approach a 10-fold ratio of that which occurs at altitudes of one or two kilometers.

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2. In reply to the second question experts have differed widely in their statements as to the diathermancy of aqueous vapor. Preston, in his Theory of Heat,[2] says:

Experiments of Lecher and Pernter.—More recently a series of experiments on the absorption of radiant heat by gases and vapors has been published by Ernest Lecher and Joseph Pernter,[3] but these new investigations, instead of settling the question in dispute between Tyndall and Magnus as to the comparative absorptions of dry and moist air, place the whole matter in a state of greater uncertainty. For whereas Tyndall found an exceptionally low absorption for dry, and a high absorption for moist air, while Magnus found the same absorption for both, and that tolerably high, the results of the experiments of Lecher and Pernter show particularly no absorption for either, or, in other words, both dry and moist air act as a vacuum toward radiant heat.

It may be safely accepted that aqueous vapor energetically absorbs only special wave-lengths in the spectrum, but so does dry air absorb other waves. If these special waves happen to be contained in the beams of radiation on which laboratory experiments are being made the results of measurements of absorption will be quite different from measurements made on other beams that do not contain the special wave-lengths. It is quite plausible that the differences between different experimentalists and between the statements in the different works on physics are due to differences in the character of the radiations that have been experimented with. Professor Langley's work for the last twenty years has been devoted to measurements which it is hoped will clear up these discrepancies.

The quotation given above from Professor Very indicates a very considerable absorption of solar radiation by the aqueous vapor in the upper atmosphere. Professor Very's conclusions

[1] Monthly Weather Review for August, 1901, Vol. XXIX, p. 364.

[2] The Theory of Heat, Thomas Preston. London and New York, 1894, pp. 485–486.

[3] Lecher and Pernter. Sitzb. der k. Akad. der Wissenschaft in Wein, Juli, 1880; Phil, Mag., January, 1881.

are based largely upon the study of the absorption bands of the solar spectrum, as measured by means of Professor Langley's bolograph, and are undoubtedly entitled to great weight.

There may be a question, however, as to the state in which moisture exists in the upper layers of the atmosphere. On account of the low temperature at great heights the amount of moisture that can exist in a state of vapor is very small, and it may be that moisture in the form of minute solid particles also exists. The action of these latter would be quite different from the absorption by water vapor.

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3. As to the third question, any satisfactory explanation of the fact that the capacity of space for vapor increases with the temperature of the space, or what is the same thing, the temperature of the vapor, must depend upon our knowledge of the nature of heat and molecules. According to the commonly accepted mechanical theory of heat and the kinetic theory of gases, the heat contained within a mass of vapor is simply the sum total of the kinetic energy of the rapidly moving molecules of vapor. The molecules of a gas are supposed to be far apart, relative to their own size, but by moving rapidly, by rebounding against each other and against the boundary of the enclosure, they occupy or dominate a large volume. To increase the temperature of this enclosure is to increase the velocity of these molecules and therefore the number of impacts and reflections that occur per second.

By increasing the velocity and therefore the kinetic energy of the molecules, we also increase the momentum with which they strike each other and the boundary surface, that is to say, we increase the general expansive pressure of the vapor. If no liquid is present and therefore if no evaporation throws more vapor into the space, then this increase of pressure corresponds to that due to the ordinary coefficient of expansion of the gas; but if we allow heat to break up liquid molecules into gaseous ones, and evaporation to increase the number of molecules in the gaseous space, until it is saturated at the new higher temperature, then the increase of pressure is the sum of two causes, namely, the increased momentum of the old molecules, and the added momentum of the new ones.

We have not used the term "vibration of vapor molecules," because that implies some regularity like an oscillation, but we speak only of the free movements and impacts of the molecules. The free movements are presumably always in nearly straight lines, as the molecules pass from one impact to the next, but the total path of a molecule is a broken line. The kinetic theory of gases allows us to determine approximately the average velocity of the molecule and the length of the average, or mean free path between two successive impacts in each kind of gas.

In order that our correspondent and readers may have the choice of several methods of looking at this question, so as to adapt their teaching to the needs of the various grades of students, we give the following extracts from recent correspondence:

Under date of April 4, 1902, Prof. J. S. Ames, of Johns Hopkins University, Baltimore, Md., writes as follows:

My understanding of the reason why an increase in temperature increases the evaporation of a liquid has always been along the lines that the effect of temperature on the liquid is such as to so increase the velocity of the particles that more of them are able to escape from the surface, and that therefore the evaporation is increased. At the same time, of course, there is an increase in the velocity of the particles of vapor. But the question as to these particles reaching the liquid surface is more one of the mean free path than of anything else, and this is not affected to any such extent as to increase the rate of condensation to as great an extent as the evaporation.

Under date of April 15, Prof. J. Willard Gibbs, of Yale University, writes, as follows:

In regard to your correspondent's question, we must remember that the average velocity of molecules in the liquid is increased as much as the average velocity in the vapor (when the temperature is increased). The restraining power of the attractions in the liquid will evidently have less effect in these greater velocities.

Dr. Edgar Buckingham, now physicist in the Department of Agriculture, under date of May 10, 1902, writes, as follows:

Heating a gas or vapor in an enclosed space of fixed volume increases its pressure. If we accept the hypothesis that matter is made up of molecules, or separate particles, we account for this increase of pressure by saying that the energy, put into the vapor in the form of heat to raise its temperature, has gone, at least in part, to increasing the kinetic energy of translation of the molecules, so that when the vapor is hotter its molecules fly about more violently, strike harder and oftener on the walls of the enclosing vessel, and so exert a greater pressure.

Now, suppose that a part of the enclosing wall consists of the surface of the liquid from which the vapor has been sent off. If we raise the temperature of the vapor without raising that of the liquid, we can not have a state of equilibrium, and we can not speak of a definite pressure of the vapor, or of a definite vapor density; we must always keep the liquid and the vapor at the same temperature and imagine them heated or cooled simultaneously.

Suppose then, that we heat a liquid in contact with its vapor, the two being enclosed in an envelope of invariable volume. According to the kinetic hypothesis, the vapor molecules fly about more violently; they strike the surface of the liquid harder and oftener; and we should naturally expect more of them to get caught among the molecules of the liquid, so that the vapor density would decrease, and we should have, in effect, a condensation of vapor and a decrease in the vapor density.

But we have been considering only the vapor without paying any attention to the liquid, and this upsets our former conclusion. It is true that more molecules of vapor may get caught in the liquid, and so be condensed, or become a part of it. But, on the other hand, the kinetic hypothesis assumes that the molecules of a liquid also are in a state of motion, although they move through shorter distances, and with less freedom than the molecules in the vapor. Heat applied to raising the temperature of the liquid, increases the violence of motion of the molecules of the liquid too. Hence, more particles are likely to arrive at the surface of the liquid, from within it, with sufficient velocity to tear themselves away from the attraction of their fellow molecules and fly away freely into the space filled with the vapor.

There are thus two opposing tendencies; one for the molecules of the liquid to fly off into the vapor space, and the other for the molecules of the vapor to get entangled in the liquid. A state of equilibrium is reached at any given temperature, when the effects of these two tendencies just balance each other. On the kinetic hypothesis, if we raise the temperature of the liquid and its vapor, both these tendencies are increased. Whichever is increased most will then predominate. But there is no way of seeing a priori, why the one tendency should increase faster than the other, because we do not know enough about the internal structure of liquids, or the way in which the mutual attraction of their molecules is influenced by temperature. We may, to be sure, say that we know that the cohesion of liquids decreases as the temperature rises, because we know experimentally, that the surface tension (which is an expression of this cohesion) does decrease with rising temperature. Hence, we may say that, with rising temperature, the violence of motion of the molecules in both liquid and vapor increases, but the restraining attractions in the liquid decrease, and there is nothing on the side of the vapor to offset this. And so, on the whole, we might expect just what actually happens. It is just as in many other cases; if we know all about the facts, we can predict some of them from the others; but we should not have been clever enough to make our prediction, if we had not known what it was that had to be predicted. Practically, we have here to content ourselves with the mere statement of the fact, namely, that the effect of the tendency of the vapor molecules to tear themselves free, by reason of their increased velocity at a higher temperature, invariably does increase faster than the effect of the tendency of the vapor molecule to fly back and become a part of the liquid; so that we invariably do have an increase of the vapor density with a rise of temperature.

The important thing is always the fact. Everyone who goes any distance in physics comes to realize that there is, in reality, no such thing as an "explanation" of anything; that the object of physics is not to "explain" facts, but to get them organized, formulated and coordinated by as few simple general statements or so-called laws as possible. The kinetic theory of gases is a good example of explaining simple and familiar facts by means of a difficult hypothesis; it assumes the existence of molecules which no one has ever seen and of which it is difficult, if not quite impossible, to form any clear conception reconcilable with all the facts. We "explain" the familiar facts of evaporation by referring them back to molecular motions, which we know nothing about from direct observation.

Under date of May 27, 1902, Prof. Ernest Merritt, of Cornell University, Ithaca, N. Y., writes, as follows:

To make the point raised by your correspondent perfectly definite, let us suppose that a certain quantity of water is placed in a closed vessel,

the space above the water containing saturated vapor. The presence of air would, of course, not modify the conditions essentially. If the temperature of the whole mass is raised it is a matter of observation that some of the water evaporates and the vapor becomes more dense, yet the pressure of the vapor is increased, and therefore the tendency of vapor molecules to go back into the liquid is greater than at the lower temperature. From the standpoint of the kinetic theory I think the explanation is somewhat as follows:

Owing to the rapid motion of the molecules some of the more rapidly moving water molecules are continually escaping from the attraction of their neighbors and passing out into the vapor, while some of the vapor molecules are at the same time continually returning again to the liquid. When these two processes just balance one another the vapor is said to be saturated. Now, if the temperature is raised the motions of the molecules become more rapid. This is true, not merely in the vapor, where their increased speed leads to greater pressure, but also in the liquid, where the result is an increased tendency for molecules to escape into the vapor. More molecules return to the liquid each second than before, but more molecules also leave the liquid each second. At first glance it is impossible to tell which of these two opposing tendencies will prevail: whether the water will evaporate or the vapor condense. A closer consideration shows, however, that the former is what should be expected. In the liquid the rise of temperature produces two effects: it increases the average speed of the molecules and it diminishes the average attractive forces between them. Just why this latter effect should be produced could only be "explained" by some more elaborate and detailed theory of molecular forces than now exists. But there can be little doubt of the fact. (Consider, for example, the effect of temperature on tensile strength.) In the vapor the molecules are so far apart that their attractive forces have very small influence upon the motion. The tendency for molecules to return to the liquid from the vapor therefore increases with rise in temperature less rapidly than the tendency of liquid molecules to escape. The result is that the density of the saturated vapor increases with the temperature.

If preferred, the matter may be put in analytical form. Whether anything is gained by so doing in this case is largely a question of individual opinion.

Suppose that a vessel contains water and water vapor in equilibrium, i. e., the vapor is just saturated. The condition for equilibrium is that no change in the system which leaves the pressure and temperature unaltered can cause an increase in the thermodynamic potential, Φ. If ϕ_1 and ϕ_2 are the thermodynamic potentials for a gram of water and a gram of steam, respectively, while M_1 and M_2 are the masses of water and steam, the condition may be written:

$$\delta\Phi = \delta\,[M_1\phi_1 + M_2\phi_2] = 0.$$

Now, $M_1 + M_2 = M =$ a constant; the change represented by δ is one which does not alter ϕ_1 and ϕ_2 (since these are functions of T and p only). Therefore

$$\delta\Phi = \phi_1\delta M_1 + \phi_2\delta M_2 = 0 = \delta M_1(\phi_1 - \phi_2).$$

Suppose now that the temperature of both water and steam is raised to $T + dT$, but that the quantity of liquid and the quantity of vapor are kept unchanged. At the temperature T they were in equilibrium. Are they so still at the new temperature? If so, we should have $\delta\Phi' = 0$ where the prime refers to the new temperature; and

$$\delta\Phi' = \delta\left[M_1\left(\varphi_1 + \frac{\partial\varphi_1}{\partial T}\,dT\right) + (M - M_1)\left(\varphi_2 + \frac{\partial\varphi_2}{\partial T}\,dT\right)\right]$$

This reduces to

$$\delta\Phi' = \delta M_1\left(\frac{\partial\varphi_1}{\partial T} - \frac{\partial\varphi_2}{\partial T}\right)dT.$$

There is, however, no reason to expect that equilibrium will still be maintained. It is rather to be expected that water will be evaporated, or that steam will condense. Since Φ' can not increase, that one of these processes which makes $\delta\phi'$ negative is the one that will occur.

Now

$$\phi_1 = w_1 + pv_1 - Ts_1$$

And

$$\phi_2 = w_2 + pv_2 - Ts_2.$$

The subscripts 1 and 2 refer to water and vapor, respectively, while w, v, and s represent the internal energy, the specific volume, and the specific entropy, respectively.

$$\delta\Phi = \delta M_1\frac{\partial}{\partial T}[w_1 - w_2 + p\,(v_1 - v_2) + T\,(s_1 - s_2)]\,dT$$

$$= \delta M_1\left[(v_1 - v_2)\left(\frac{\partial p}{\partial T}\right)_M - (s_1 - s_2)\right]dT.$$

Remembering that $T\,(s_2 - s_1) = r$, where r is the heat of vaporization, and that

$$r = (v_2 - v_1)\,T\,\frac{\partial p}{\partial T}$$

We have

$$\delta\Phi = \delta M_1\,(v_1 - v_2)\left[\left(\frac{\partial p}{\partial T}\right)_M - \frac{\partial p}{\partial T}\right]dT.$$

The derivative $\left(\frac{\partial p}{\partial T}\right)_M$ refers to the temperature rate of change of pressure for a *fixed amount* of vapor, which is allowed to supersaturate; $\frac{\partial p}{\partial T}$ without the brackets, gives the temperature rate of change of the vapor pressure corresponding to saturation. Now, so far as the writer is aware, the pressure of saturated vapor always increases with the temperature more rapidly than the pressure of unsaturated vapor at the same temperature. Therefore $\left(\frac{\partial p}{\partial T}\right)_M - \frac{\partial p}{\partial T}$ is negative. It also seems universally true that a given mass of substance occupies more space in the vapor form than as a liquid. Therefore $v_1 - v_2$ is negative. In order to make $\delta\Phi'$ negative, we must therefore have δM_1 negative. In other words, the tendency is for water to evaporate, and the vapor becomes more dense. If some substance could be found which contracted upon evaporation, such a substance would act exactly the opposite way from the usual one which your correspondent cites. I see nothing in the preceding reasoning to exclude the possibility of such a substance being found, although it would be remarkably different in its properties from what we are accustomed to.

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4. In reply to the fourth question we may say that the author of the "Gulf Stream Myth" may perhaps not be considered a technical authority in meteorology, but his article certainly seems to the Editor to be perfectly fair. We do not find any important discordance between him and Prof. William M. Davis (see page 68 of Davis's Elementary Meteorology). All agree that the ocean surface water gives more moisture and therefore more latent heat to the air than does the same area of land at the same latitude, but it gives less sensible heat or temperature. All agree about the general surface drift of the North Atlantic under the influence of southerly and westerly winds, and that the winds and currents combine to carry the isotherms northeastward toward Iceland and Spitzbergen; but the present question is as to the special influence of the Gulf Stream proper in deflecting general isothermal lines, in comparison with the general influence of the oceanic surface drift and the winds. On this there can be but one opinion: viz, it is insignificant. The Gulf Stream off the coast of Florida may be allowed to have a velocity of 4 miles per day and the cross section of the stream may be 5 square miles. The surface drift of the oceanic regions west of Ireland may average 1 mile per day across a line extending from southern Ireland north to Iceland, or 900 miles; the cross section of this drift has an area of perhaps 2 square miles, the drift being toward northeast. A similar drift toward the southeast prevailed between Ireland and the Azores. At an average rate of 2 miles per day, it would require fifteen hundred days for the surface waters of the Gulf Stream proper to reach the eastern Atlantic coast and turn either northeastward or southeastward. In this long time its surface temperature would be modified by alternating northerly and southerly winds and would have affected the the temperature of all the air that has blown over this part of the ocean. The vapor evaporated from the great area of cool water is more important than that from the smaller area of warm Gulf Steam water. The southwest winds that bring moisture, cloud, and rain, and warmth to Europe, get far more of all these from the general surface of the Atlantic than from the Gulf Stream proper.

In the MONTHLY WEATHER REVIEW for August, 1901, page 376, is an extract from an article entitled "Popular errors in meteorology and geography," by Mr. Henry Gannett. A section is devoted to climate and ocean currents, in which he reaffirms the views of Mr. Harvey M. Watts as set forth in the "Gulf Strem Myth" (MONTHLY WEATHER REVIEW, Vol. XXVIII, page 393).

The comparatively warm climates of the western shores of Europe and America are to be attributed to the prevailing

moist winds that blow upon them from the warmer portions of the Atlantic and Pacific Oceans, respectively, and not to any abnormal degree of heat that is conveyed to those coasts through the medium of the ocean currents. To be sure the warm winds and currents appear to accompany each other, but no doubt the currents are more dependent upon the winds for their strength than are the winds upon the currents for their temperature.

METEOROLOGY AT THE BRITISH ASSOCIATION, BELFAST, SEPTEMBER, 1902.

The following extract from the opening address by Prof. Arthur Schuster, Chairman of the Subsection of Astronomy and Cosmical Physics, has so much that is of value to the meteorological student that by special request we reprint it from a recent number of Nature:

The question I wish to bring to your notice to-day is an old one: if two events happen simultaneously or one follows the other at a short interval of time, does this give us any reason to suppose that these two events are connected with each other, both being due to the same cause, or one being the cause of the other? Everyone admits that the simple concurrence of events proves nothing, but if the same combination recurs sufficiently often we may reasonably conclude that there is a real connection. The question to be decided in each case is what is "sufficient" and what is "reasonable." Here we must draw a distinction between experiment and observation. We often think it sufficient to repeat an experiment three or four times to establish a certain fact, but with meteorological observations the case is different, and it would, *e. g.*, prove very little if on four successive full moons the rainfall had been exceptionally high or exceptionally low. The cause of the difference lies in the fact that in an experiment we can control to a great extent all the circumstances on which the result depends, and we are generally right in assuming that an experiment which gives a certain result on three successive days will do so always. But even this sometimes depends on the fact that the apparatus is not disturbed, and that the housemaid has not come in to dust the room. Here lies the difference. What is possible in a laboratory, though perhaps difficult, is not possible in the upper regions of the atmosphere, where some unseen hand has not made a clean sweep of some important condition.

When we can not control accessory circumstances we must eliminate them by properly combining the observations and increasing their number. The advantage does not lie altogether on the side of experiment, because the very identity of condition under which the experiment is performed gives rise to systematic errors, which nature eliminates for us in the observational sciences. In the latter also the great variety in the combinations which offer themselves allow us to apply the calculus of probability, so that in any conclusion we draw we can form an idea of the chance that we are wrong. Astronomers are in the habit of giving the value of the "probable error" in the publication of their observations. Meteorologists have not adopted this custom, and yet their science lends itself more readily than any other to the evaluation of the deviations from the mean result, on which the determination of the probable error depends. We look forward to the time when weather forecasts will be accompanied by a statement of the odds that the prediction will be fulfilled.

The calculation of the probability that any relationship we may trace in different phenomena indicates a real connection seems to me to be vital to the true progress of meteorology, and although I have on previous occasions (Cambridge Phil. Trans., Vol. XVIII. p. 107) already drawn attention to this matter I should like once more to lay stress on it.

The particular case I wish to discuss (though the methods are not restricted to this case) is that in which one of the two series of events between which relationship is to be established has a definite period, and it is desired to investigate the evidence of an equal period in the other series.

Connections between the moon and earthquakes, or between sun spots and rainfall if proved to exist, would form examples of such relationships. The question to be decided in these cases would be, is there a lunar period of earthquakes, or an 11-year sun-spot period of rainfall.

Everyone familiar with Fourier's analysis knows that there is a lunar or sun spot, or any other period in any set of events from volcanic eruptions down to the birthrate of mice; what we want to find out is whether the periodicity indicates a real connection or not. Let us put the problem into its simplest form. Take n balls, and by some mechanism allow them to drop so that each falls into one of m compartments. If finally they are equally distributed each compartment would hold n/m balls. If this is not the case we may wish to find out whether the observed inequality is sufficient to indicate any preference for one compartment or how far it is compatible with equality of chance for each. If we were able to repeat the experiment as often as we like we should have no difficulty in deciding between the two cases, because in the long run the average number received by each compartment would indicate more and more closely the extent of bias which the dropping mechanism might possess. But we are supposed to be confined to a single trial, and draw our conclusions as far as we can from it.

It would be easy to calculate the probability that the number of balls in any one compartment should exceed a given number, but in order to make this investigation applicable to the general problem of periodicities we must proceed in a different manner. If the compartments are numbered, it does not matter in which order, and a curve be drawn in the usual manner representing the connection between the compartments and the number of balls in each, we may, by Fourier's analysis, express the result by means of periodic functions. The amplitude of each period can be shown on the average to be $\frac{1}{m}\sqrt{\pi n}$. It is often more convenient to take the square of the amplitude—call it the intensity—as a test, and we may then say that the "expectancy" of the intensity is $4n/m^2$. The probability that the intensity of any period should be k times its average or expectancy is e^{-k}. We may apply this result to test the reality of a number of coincidences in periods which have been suspected. A lunar effect on earthquakes is in itself not improbable, as we may imagine the final catastrophe to be started by some tidal deformation of the earth's crust. The occurrence of more than 7,000 earthquakes in Japan has been carefully tabulated by Mr. Knott according to lunar hours, who found the Fourier coefficient for the lunar day and its first three submultiples to be 10.3, 17.9, 10.9, 39.7; the expectancy on the hypothesis of chance distribution for these coefficients I find to be 19.3, 15.7, 10.6, 5.02. The comparison of their numbers disproves the supposed connection; on the other hand, the investigations of Mr. Davison on solar influence have led to a result much in favour of such influence, the amplitude found being in one series of observations equal to five times, and in the other to fifteen times the expectancy. The probability that so large an amplitude is due to accident in the first case is one in 300 millions, and in the second the probability of chance coincidence would be represented by a fraction, which would contain a number of over seventy figures in the denominator. We may therefore take it to be established that the frequency of earthquakes depends on the time of year, being greater in winter than in summer. With not quite the same amount of certainty, but still with considerable probability, it has also been shown that earthquake shocks show a preference for the hours between 9 a. m. and noon.

A great advantage of the scientific treatment of periodical occurrences lies in the fact that we may determine a *priori* how many events it is necessary to take into account in order to prove an effect of given magnitude. Let us agree, for instance, that we are satisfied with a probability of a million to one as giving us reasonable security against a chance coincidence. Let there be a periodic effect of such a nature that the ratio of the occurrence at the time of maximum to that at the time of minimum shall on the average be as $1+\lambda$ to $1-\lambda$, then the number of observations necessary to establish such an effect is given by the equation $n=200/\lambda^2$. If there are 2 per cent more occurrences at the time of maximum than at the time of minimum $\lambda=0.01$, and n is equal to two million. If the effect is 5 per cent, the number of events required to establish it is 80,000.

To illustrate these results further, I take as a second example a suggested connection between the occurrence of thunderstorms and the relative position of sun and moon. Among the various statistical investigations which have been made on this point, that of Mr. MacDowall lends itself most easily to treatment by the theory of probability. One hundred and eighty-two thunderstorms observed at Greenwich during a period of fourteen years have been plotted by Mr. MacDowall as distributed through the different phases of the moon, and seem to show a striking connection. I have calculated the principal Fourier coefficient from the data supplied, and find that it indicates a lunar periodicity giving for the ratio of the number of thunderstorms near new moon to that near full moon the fraction 8.17 to 4.83.

This apparently indicates a very strong effect, but the inequality is only twice as great as that we should expect if thunderstorms were distributed quite at random over the month, and the probability of a true connection is only about 20 to 1. No decisive conclusions can be founded on this, the number of thunderstorms taken into account being far too small. We might dismiss as equally inconclusive most of the other researches published on the subject were it not for a remarkable agreement among them, that a larger number of storms occur near new moon than near full moon.

I have put together in the following table the results of all investigations that are known to me; following the example of Koeppen, I have placed in parallel columns the number of thunderstorms which have occurred during the fortnight including new moon, and the first quarter and the fortnight including the other two phases.

It will be seen that out of fourteen comparisons, thirteen show higher numbers in the first column, there being also, except in two cases, a general agreement as regards the magnitude of the effect. Two of the stations given in the table, Göttingen and Gotha, are perhaps geographically too near together to be treated as independent stations, and we may therefore say that there are thirteen cases of agreement, against which there is only one published investigation (Schiaparelli) in which the maximum effect is near full moon.

Place of observation and author.	Time of observations.	Percentage of thunderstorms during the fortnight including—	
		New moon and first quarter.	Full moon and last quarter.
Karlsruhe (Eisenlohr)	1801–31	50.8	49.2
Gotha (Luedicke)	1867–75	72.5	27.5
Vigevano (Schiaparelli)	1827–64	46	54
Germany (Köppen)	1879–83	56	44
Glatz (Richter)	1877–84	62	38
United States (Hazen)	1884	56.5	43.5
Prag (Grüss)	1840–59	51	49
Prag (Grüss)	1860–79	52.5	47.5
Göttingen (Meyer)	1857–80	54	46
Kremsmunster (Wagner)	1862–87	53.8	46.2
Aix la Chapelle (Polis)	1833–92	54.4	45.6
Sweden (Ekholm)	1880–95	53.8	46.2
Batavia (Van Der Stok)	1887–95	51.9	48.1
Greenwich (McDowall)	1888–91	54	46
Average		54.9	45.1

The probability that out of thirteen cases in which there are two alternatives, selected at random, twelve should agree and one disagree is one in twelve hundred. If the details of the investigations summarized in the above table are examined, considerable differences are found, the maximum taking place sometimes before new moon and sometimes a week later. There is, however, evidently sufficient *prima facie* evidence to render an exhaustive investigation desirable. The most remarkable of all coincidences between thunderstorms and the position of the moon remains to be quoted. A. Richter has arranged the thunderstorms observed at Glatz, in Silesia, according to lunar hours, and finds that in each of seven successive years the maximum takes place within the four hours beginning with upper culmination. If this coincidence is a freak of chance, the probability of its recurrence is only one in three hundred thousand. The seven years which were subjected to calculation ended in 1884. What has happened since? Eighteen years have now elapsed, and a further discussion with increased material would have definitely settled the question, but nothing has been done, or, at any rate, published. To me it seems quite unintelligible how a matter of this kind can be left in this unsatisfactory state. Meteorological observations have been allowed to accumulate for years, one might be tempted to say for centuries, yet when a question of extraordinary interest arises we are obliged to remain satisfied with partial discussion of insufficient data.

The cases I have so far discussed were confined to periodical recurrences of single detached and independent events, the condition, under which the mathematical results hold true, being that every event is entirely independent of every other one. But many phenomena, which it is desirable to examine for periodic regularities, are not of this nature. The barometric pressure, for instance, varies from day to day in such a manner that the deviations from the mean on successive days are not independent. If the barometer on any particular day stands half an inch above its average it is much more likely that on the following day it should deviate from the mean by the same amount in the same direction than that it should stand half an inch below its mean value. This renders it necessary to modify the method of reduction, but the theory of probability is still capable of supplying a safe and certain test of the reality of any supposed periodic influence. I can only briefly indicate the mathematical theorem on which the test is founded. The calculation of Fourier's coefficients depends on the calculation of a certain time integral. This time integral will for truly homogeneous periodicities oscillate about a mean value, which increases proportionately to the interval, while for variations showing no preference for any given period, the increase is only proportional to the square root of the time.

Investigations of periodicities are much facilitated by a certain preliminary treatment of the observations suggested by an optical analogy. The curve, which marks the changes of such variables as the barometric pressure, presents characteristics similar to those marking the curve of disturbance along a ray of white light. The exact outline of the luminous disturbance is unknown to us, but we obtain valuable information from its prismatic analysis, which enables us to draw curves connecting the period and intensity of vibration. For luminous solids we thus get a curve of zero intensity for infinitely short or infinitely long radiations, but having a maximum for a period depending on temperature. Gases, which show preference for more or less homogeneous vibrations, will give a serrated outline of the intensity curve.

I believe meteorologists would find it useful to draw similar curves connecting intensity and period for all variations which vary round a mean value such as barometric, thermometric or magnetic variations. These curves will, I believe, in all cases add much to our knowledge; but they are absolutely essential if systematic searches are to be made for homogeneous periods. The absence of any knowledge of the intensity of periodic variation renders it, *e. g.*, impossible to judge of the reality of the lunar effect which Ekholm and Arrhenius believe to have traced in the variations of electric potential on the surface of the earth. The problem of separating any homogeneous variation, such as might be due to lunar or sun spot effects, is identical with the problem of separating the bright lines of the chromosphere from the continuous overlapping spectrum of the sun. This separation is accomplished by applying spectroscopes of great resolving powers. In the Fourier analysis, resolving power corresponds to the interval of time which is taken into account; hence, to discover periodicities of small amplitude we must extend the time interval of the observations.

I believe that the curve which connects the intensity with the period will play an important rôle in meteorology. It is a curve which ought to have a name, and for want of a better one I have suggested that of *periodograph*. To take once more barometric variations as an example, it is easy to see that just as in the case of white light the periodograph would be zero for very short, and probably also for very long, periods, There must be some period for which intensity of variation is a maximum. Where is that maximum? And does it vary according to locality? The answer to these questions might give us valuable information on the difference of climate. Once the periodograph has been obtained, the question of testing the reality of any special periodicity is an extremely simple one. If h be the height of the periodograph, the probability that, during the time interval chosen, the square of the Fourier coefficient should exceed kh is e^{-k}. If we wish this quantity to be less than a million, k must be about 11; so that in order to be reasonably certain that any periodicity indicates the existence of a truly homogeneous variation, the square of the Fourier coefficient found should not be less than 11 times the corresponding ordinate of a periodograph.

I have calculated in detail the periodograph of the changes of magnetic declination at Greenwich, taking as basis the observations published for the twenty-five years 1871–1895. It was not, perhaps, a very good example to choose, on account of the complications introduced by the secular variation, but my object was to test the very persistent assertions that have been made as to the reality of periodic changes of twenty-six days or thereabouts. The first suggestion of such a period came from Hornstein, of Prague, who ascribed the cause of the period to the time of revolution of the sun round its axis. He only discussed the records for one year's observations, but the evidence he offered was sufficient to impress Clerk Maxwell with its genuineness, Since Hornstein's first attempts, a great many rough and some very elaborate efforts have been made by himself and others to prove a similar period in various meteorological variations. The period found by different computors differed, but there is a good deal of latitude allowed if the rotation of the sun really has an effect on terrestrial phenomena, because the angular velocity of the visible solar surface varies with the latitude. Hornstein himself and some of his followers deduced a period not differing much from twenty-six days, while Prof. Frank Bigelow, using a larger quantity of material, finds 26.68 days, and Ekholm and Arrhenius return to twenty-six days, or, as they put it more accurately, to 25.929 days. The two latter investigators do not, however, adopt the idea that this periodicity is due to the rotation of the sun. None of these periods can stand the test of accurate investigation.[1]

[1] It is proper for the Editor to call attention to the fact that Professor Schuster's argumentation in general, but especially his conclusion with regard to Professor Bigelow's period of 26.68 days, had been carefully considered and refuted in a recent publication of the Weather Bureau, which, unfortunately, could not have reached him before he delivered his interesting address at Belfast. On pages 93 and 94 of a Report on Eclipse Meteorology and Allied Problems, published as Weather Bureau Bulletin I, Professor Bigelow has brought out two important points, viz:

1. That the magnetic declinations observed at Greenwich and made the basis of Schuster's calculations do not represent the solar conditions so faithfully, by far, as do the resultants of the vertical and horizontal components which were made the basis of Professor Bigelow's studies. Professor Schuster himself has recognized that there can be no east and west components due to the sun as a magnetic sphere. The variations of the auroras and thunderstorms studied by Ekholm and Arrhenius, and also the variations of declination at Greenwich, as studied by Schuster, are affected by irregularities pertaining to the earth which must be eliminated before we can feel sure that we are studying solar phenomena.

2. Professor Schuster has computed the ratio of the intensity to the expectancy for a number of assumed periods and has made this ratio serve to indicate the probability of the actual existence of the respective periods in the variation of the horizontal declination at Greenwich. These periods and ratios are shown in the following table:

Period, days.	Ratio.	Intensity.
25.809	5.86	0.006168
25.825	4.07	0.004182
25.87	0.95	0.001001
25.929	0.93	0.001027
26.181	1.09	0.001144
26.255	1.04	0.001081
26.68	0.23	0.000242
26.814	5.64	0.005936
27.061	2.80	0.002948

As the result of my calculations, I can definitely state that the magnetic declination at Greenwich shows no period between 25.5 and 27.5 days having an amplitude as great as 6″ of arc. The influence of solar rotation on magnetic variation may therefore be considered to be definitely disproved.

The intensity of the periodograph increases rapidly with the period, and minute variations are therefore more easily detected in short than in longer periods. Six seconds of arc forms about the limit of amplitude, which can be detected in twenty-five years of observations, when the period is about twenty-six days; and from what has been said above, the amplitude which can be detected will be seen to vary inversely with the square root of the time interval. For periods of about fourteen days, an amplitude of 3″ of arc is still distinguishable with the material I have used; and such an amplitude is actually found for a period which has half the synodic month as its time. The chance that this apparent variation is due to an accidental coincidence is one in two thousand; and I can not therefore assert its definite existence beyond all possibility of cavil. But it is surely significant that of all the periods possible between 12.3 and 13.7 days, that gives the highest amplitude which coincides with half the synodic revolution of the moon. That it is at all possible to detect variations of 3″ of arc in the observations which are taken to 6″, with a probability of error of only one in two thousand, is, I think, a proof of the value of the method and the carefulness of the observations. The periodograph has another valuable use. It not only gives us the time necessary to establish true periodicities of given amplitude, but it also gives us an outside limit for the time beyond which an accumulation of material is of no further advantage. That limit is reached when the time is sufficient to discover the smallest amplitude which the instruments, owing to their imperfections, allow us to detect.

I am only concerned to-day with a purely statistical inquiry, and not with the explanation of any suggested relationship. To prevent misunderstandings, however, I may state that I consider the possibility of a direct magnetic or electric action of the moon excluded; as regards the latter, the diurnal variations of electric potential would be so much affected by a lunar electrification sufficiently strong to influence the outbreak of thunderstorms that it could not have escaped discovery. We must not, however, be dogmatic in asserting the impossibility of indirect action. The unexpected discovery of radio-activity has opened out an entirely new field, and we can not dismiss without renewed careful inquiry the evidence of lunar action which I have given. Its reality can be decided by observation only. No—not by observation only—but by observation supplemented by intelligent discussion; and this brings me to my concluding appeal, which I wish to urge upon you with all the legitimate weight of strong conviction and all the illegitimate influence of presidential infallibility.

The subjects with which our subsection is concerned deal with facts which are revealed to us by observation more frequently than by experiment. There is in consequence a very real danger that the importance of observation misleads us into mistaking the means for the end, as if observation alone could add anything to our knowledge. Observation is like the food supplied to the brain, and knowledge only comes through the digestion of the food. An observation made for its own sake and not for some definite scientific object is a useless observation. Science is not a museum for the storage of disconnected facts and the amusement of the collecting enthusiast. I dislike the name "observatory" for the astronomical workshop, for the same reason that I should dislike my body to be called a food receptacle. Your observing dome would be useless without your computing room and your study. What you want is an astronomical laboratory, a meteorological or magnetic laboratory; attaching to the word "laboratory" its true meaning, which is a workshop in which eyes and hands and brains unite in producing a combined result.

The problems which confront the astronomer being more definite than those of meteorology, astronomy has grown under the stimulus of a healthy tradition. Hence, it is generally recognized, at any rate in the principal observatories, that the advance of knowledge is the chief function of the observer. Nevertheless, the president of the astronomical department of section A last year (Prof. H. H. Turner) has found it necessary, in his admirable address, to warn against the danger there is that the astronomer should allow himself to be swallowed up in a routine work and mere drudgery. The descent is easy: You begin by being a scientific man, you become an observer, then a machine, and finally—if all goes well—you design a new eyepiece.

If such a danger exists in astronomy, what shall we say about meteorology? That science is bred on routine, and drudgery is often its highest ambition. The heavens may fall in, but the wet bulb must be read. Observations are essential, but though you may never be able to observe enough, I think you can observe too much. I do not forget the advances which meteorology has made in recent years, but if you look at these advances, I think you will find that most of them do not depend on the accumulation of a vast quantity of material. The progress in some cases has come through theory, as in the applications of thermodynamics, or through special experiments, as by kite and balloon observations, and when it has come through the ordinary channels of observation, only a comparatively short period of time has been utilized. It would not be a great exaggeration to say that meteorology has advanced in spite of the observations and not because of them.

What can we do to mend matters? If we wish to prepare the way for the gradual substitution of a better system, we should have some one responsible for the continuation of the present one. For this purpose it should be recognized that the head of the meteorological office is something more than a secretary to a board of directors; also that he is appointed to conduct meteorological research and not to sign weather forecasts. The endowment of meteorology should mean a good deal more than the endowment of the telegraph office which transmits the observations.

It will be observed that the intensities are less than they should be on the theory of chance, and it will also be noticed that there is about the same probability or ratio for the periods 25.809 and 26.814. Of course both of these can not be simultaneously correct, so that Schuster's method of discussion has failed to find any period that conforms near enough to Greenwich observations to justify speaking of it as a law of nature. But this failure does not affect the question as to the existence of a true period in the solar phenomena; it simply shows that the Greenwich observations of declination are probably not the proper data upon which to base any such research. As Professor Bigelow's work is based upon the observation of both horizontal and vertical components for many years at stations scattered over the whole globe, his data, therefore, represent actual solar conditions as nearly as these can be determined from terrestrial observations and must give us results of the highest probability. Notwithstanding the expense, it is to be hoped that these original data and laborious computations may be published in full as an important contribution to the study of the relation between the earth and the sun.—ED.

WEATHER BUREAU MEN AS INSTRUCTORS IN METEOROLOGY.

According to the published course of studies at Cornell University for the year 1902–3, meteorology is included under geology and physical geography, and two courses are offered to the students by Prof. R. S. Tarr and Section Director R. G. Allen. The course in elementary meteorology occupies two hours a week in the first half year, and the course following this, entitled "Study of Weather Bureau Methods," occupies two hours a week for the whole year. Mr. Allen writes that in the academic year 1900–1901 10 students took the course in elementary meteorology; in the year 1901–2 there were 27; in the current year 1902–3 about one hundred applied but only 48 could be accommodated. In addition to these, two students who have finished the course in elementary meteorology are now taking the course in elementary methods and will take the Weather Bureau examination on October 21.

In the College of Agriculture meteorology appears to find no place, but in the College of Forestry it is one of the courses prescribed for the freshmen year. Doubtless, however, there are some students in the College of Agriculture who take meteorology as an elective study, and one of the seniors in the agricultural course also contemplates taking the Weather Bureau examination.

Mr. W. H. Alexander, Observer, Weather Bureau, reports that on September 18 he delivered an address on the Weather Bureau and the Farmer before the conference of agricultural teachers at Rio Piedras, Porto Rico, W. I. This address was enthusiastically received and was followed by a number of talks by the teachers on cooperation with the Weather Bureau.

W. A. Shaw, Observer, Northfield, Vt., reports that he addressed farmers' institutes in Maine at Perry, August 13, and East Machias, August 14.

JOHN T. PROBERT.

Another of our oldest voluntary observers has passed away. Mr. John T. Probert, of Paterson, N. J., was born in West Drayton, Middlesex, England, in 1829 of Welsh parentage. When he was 18 years of age his family settled in Paterson, N. J. He learned the trade of a cobbler and developed a large business in the manufacture of shoes. He was an omniverous reader and his biographer in the Paterson Daily Press states that even at an early age he had acquired a comprehensive library. He was a close student of nature, an ardent lover of geology, and an enthusiastic lover of meteorology.

HEINRICH WILD.

After a long and severe illness Professor Dr. Heinrich Wild died at Zurich, Switzerland, on Friday, September 5. We have already, in the MONTHLY WEATHER REVIEW for March, 1899, pages 105–106, given a short sketch of the important works in meteorology that we owe to this distinguished physicist. From 1856 to 1868 Professor Wild was a professor in the university at Bern, where he did much to establish a uniform system of standards of measurement and devoted his attention to every problem bearing on terrestrial physics. In 1868 he was called to St. Petersburg as director of the Central Physical Observatory, which place he filled until July, 1895, and gave an immense impetus to accurate meteorological and magnetic work throughout the Russian Empire. In the latter year he obtained permanent leave of absence on account of his health and returned to his home in Zurich, where he had been born on December 17, 1833. It is only a few months since we received from Professor Wild an extensive memoir on the Foehn, apparently the last of his numerous publications.

SENOR AUGUSTIN M. CHAVEZ.

We regret to announce the death about the middle of September of Señor Augustin M. Chavez. This distinguished engineer and former superintendent of telegraphs under the Secretary of the Interior organized in 1897 the system of daily telegraphic meteorological reports and weather maps that is now so well established in Mexico. To him also must be attributed the instructions to observers and the comments on the methods of utilizing the weather maps published from time to time in the official documents of the Department of the Interior of the Republic of Mexico.

CORRIGENDA.

August, 1902, p. 403, Table 1, substitute the following corrected copy:

TABLE 1.

Name of planet or satellite.	Critical velocity in meters, v'.	Velocity of the mean square in meters, v.	Density of a gas $H=1$, that will escape as freely as does helium from the earth, ρ'.	Density of gas that will escape as freely as hydrogen, ρ''.	Lightest of the known gases or vapors that will not escape.	Molecular weight.
Moon	2380	257.	39.	78.	Carbondioxide	44
Mercury	4641*	500. 6	10. 25	20. 5	Nitrogen	28
Venus	9546	1029.	2. 56†	5. 12	Water vapor	18
Earth	10500	1133.	2.	4.	Water vapor	18
Mars	4803	517.	9. 57	19. 14	Nitrogen	28
Jupiter	47233	5095.	0. 099	0. 198	Hydrogen	2
Saturn	24508	2633.	0. 37	0. 74	Hydrogen	2
Uranus	17299	1865.	0. 74	1. 48	Hydrogen	2
Neptune	18002	1942.	0. 68	1. 36	Hydrogen	2

* Assuming its rotation period to be 88 days. † Calculated by the writer.

Page 403, column 2, line 18 from bottom for "were" read "are."

Page 403, column 2, line 17 from bottom for "helium" read "hydrogen."

Page 405, Table 2, column 6, heading, omit "in c. c."

Page 405, line 2, below Table 3, after "hydrogen" insert "or helium."

THE WEATHER OF THE MONTH.

By W. B. STOCKMAN, Forecast Official, in charge of Division of Records and Meteorological Data.

CHARACTERISTICS OF THE WEATHER FOR SEPTEMBER.

September, 1902, was an abnormal month and was characterized by a deficiency of pressure generally over the country.

Temperature was below the normal and generally markedly so, in some States lower than for years past, excepting on the Pacific coast and in Idaho, New York, and New England, where it was in excess.

Precipitation was in decided excess in some districts, and generally above the average, except in upper Michigan, the Pacific coast, Plateau and some northwestern districts, northeastern Minnesota, and a few scattered localities on the Atlantic coast, where there was a deficiency, but generally a very slight one.

Cloudiness was generally above the average, except in the Florida Peninsula, North Dakota, and the northern Plateau and north Pacific regions, where it was below, and the west Gulf States and middle Plateau region, where the average obtained.

Relative humidity was generally above the normal, except in the northern and middle Pacific and northern and southern Plateau regions, North Dakota, the Missouri Valley, and the Florida Peninsula, where it was below, and in the southern slope region, where it was normal.

PRESSURE.

The distribution of monthly mean pressure is shown graphically on Chart VI and the numerical values are given in Tables I and VI.

The area of 30.00 inches, or slightly higher, of mean pressure overlay the lower Lake region, Ohio Valley and Tennessee, northern part of the South Atlantic and the Middle Atlantic and New England States; and another area of about the same strength obtained over the north Pacific coast district.

The region of lowest mean pressure was over the Southwestern States and the valley of California; a mean of 29.75 inches for the month was reported from Yuma, Ariz. The districts where the pressure was above the normal were small and scattered, comprising a portion of the Florida Peninsula, the northern two-thirds of New England, the coasts of middle and the northern part of southern California, and the northwestern eighth of the country, with departures not exceeding +.08 inch. In the remainder of the country the pressure was below the normal, with departures no greater than in the region where it was above.

The pressure increased over that of August, 1902, along the Pacific coast, the coast of the Gulf of Mexico generally, North Dakota, the northern portion of the upper Missouri Valley, the upper Mississippi Valley and the upper Lake region; elsewhere it diminished.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

Generally the trend of the isotherms was to the southward of their position in 1901, the most marked departure appearing in the region between the Mississippi River and the Appalachian Mountains.

The mean monthly temperature was slightly above the normal in parts of New York, Pennsylvania, Florida, Alabama, Mississippi, Louisiana, and southern Texas, in New England generally, the western part of the Plateau regions, and in the Pacific districts, except along the northern and the extreme southern coasts; elsewhere it was below the normal, and generally decidedly so, the mean daily departure amounting to from —2° to —6° over the central valleys and the eastern part of the middle slope region.

Maximum temperatures of 90°, or higher, occurred, except in the Lake region and in portions of New England, the Middle Atlantic States, central Appalachian region, upper Mis-

sissippi and Missouri valleys, North Dakota, the slopes and the middle Plateau; of 100°, or higher, in parts of Texas, Arkansas, Oklahoma, Kansas, Utah, Arizona, and California; and of 110° to 115° in western Arizona and southeastern California. Freezing temperatures were reported generally from the Northern States and the Plateau and slope regions.

Extremely low temperatures were observed in several localities, some stations reporting the lowest on record for September. The weather was quite cool during the first week in the Lake region, upper Mississippi Valley and parts of the Missouri Valley; and during the second week in the South Atlantic States generally, and parts of the Missouri Valley, Rocky Mountain and Pacific regions; the third week was below the normal generally throughout the country, and in parts of the west Gulf States, Tennessee and the Ohio, upper Mississippi and Missouri valleys the daily departures averaged —10°, or more, per day. The fourth week was above the normal generally. The lowest September means in twelve years were reported from Arkansas; in fifteen years from Missouri; and in sixteen years from Kansas, in which State the mean at each station was below its normal.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	61.0	+0.3	+ 2.7	+0.3
Middle Atlantic	12	66.5	−0.5	− 4.3	−0.5
South Atlantic	10	73.4	−0.8	− 7.6	−0.8
Florida Peninsula	8	79.9	+0.8	− 2.8	−0.3
East Gulf	9	75.8	−0.1	+ 0.4	0.0
West Gulf	7	74.8	−1.2	+ 4.1	+0.5
Ohio Valley and Tennessee	11	67.3	−1.3	− 7.3	−0.8
Lower Lake	8	63.0	−0.1	− 2.7	−0.3
Upper Lake	10	57.2	−1.8	+ 9.6	+1.1
North Dakota	8	54.3	−3.1	+12.3	+1.4
Upper Mississippi Valley	11	61.4	−3.6	− 0.9	−0.1
Missouri Valley	11	61.0	−4.2	+ 3.3	+0.4
Northern Slope	7	56.7	−1.4	+ 9.3	+1.0
Middle Slope	6	63.7	−4.0	+ 6.3	+0.7
Southern Slope	6	69.4	−3.2	+ 7.4	+0.8
Southern Plateau	13	69.5	+0.5	− 2.3	−0.3
Middle Plateau	9	60.0	−0.6	+ 0.7	+0.1
Northern Plateau	12	58.3	+0.5	+ 2.0	+0.2
North Pacific	7	57.3	−0.1	+ 1.8	+0.2
Middle Pacific	5	64.6	+1.4	− 0.3	0.0
South Pacific	4	69.2	+0.8	− 3.7	−0.4

In Canada.—Prof. R. F. Stupart says:

The temperature was above the average in Quebec and the Maritime Provinces, the greatest positive departures occurring in Prince Edward Island and Cape Breton, and amounting to from 3° to 4°. In Ontario from the Georgian Bay district south to Lake Ontario, and east to the boundary, it was from average to 2° above; elsewhere from average to 3° below, the greatest negative departures being recorded in the Lake Superior region. In Manitoba, the Territories, and British Columbia it varied from average to 4° below, except at a few points in the extreme southern parts of the Territories and British Columbia where it was from average to 1° above. The chief negative departures were at the more northerly stations in British Columbia.

PRECIPITATION.

The rainfall was from 2 to slightly over 4 inches in excess of the normal in parts of Florida, Mississippi, Louisiana, Arkansas, Ohio, Indiana, lower Michigan, western Iowa, Nebraska, southeastern Wyoming, and northeastern Colorado, and slightly more than 5 inches in east-central Tennessee and extreme southeastern South Dakota. Where there was a deficiency the departures were, as a rule, slight, excepting along the north Pacific coast, where they were from 1 inch to 3.4 inches; in the eastern portion of the central part of the South Atlantic States, where they ranged from about 1 inch to 3 inches; in upper Michigan and northeastern Minnesota, where they were slightly over 2 inches; and in scattered localities in eastern South Dakota, western Minnesota, Oklahoma, and northeastern Texas, where they were somewhat over 1 inch.

Monthly amounts of 10 inches or more were reported from Florida, southeastern Texas, Oklahoma, northwestern Iowa, northeastern Pennsylvania, and northeastern Georgia. Practically no rain occurred in California, more than one-half of the stations reporting none; no rainfall also was reported from a number of stations in Arizona and none occurred during the first two weeks in Idaho, and in a large area about the Snake River basin no appreciable amount fell during the month.

Drought conditions were broken during the second week in Pennsylvania, and in West Virginia during the fourth week, but continued in the valley district of Virginia throughout the month. Marked departures above the normal occurred in many districts during the last week.

Snows occurred at several places in Colorado between the 5th and 21st and in Idaho during the latter part of the month.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	3.48	109	+0.3	− 2.0
Middle Atlantic	12	4.82	126	+1.0	− 2.9
South Atlantic	10	4.54	85	−0.8	−11.9
Florida Peninsula	8	8.52	109	+0.7	− 2.1
East Gulf	9	6.25	147	+2.0	−10.6
West Gulf	7	4.96	125	+1.0	− 6.7
Ohio Valley and Tennessee	11	3.79	131	+0.9	− 7.1
Lower Lake	8	4.40	147	+1.4	+ 1.1
Upper Lake	10	3.24	94	−0.2	− 2.1
North Dakota	8	0.56	48	−0.6	+ 0.8
Upper Mississippi Valley	11	3.10	97	−0.1	+ 1.8
Missouri Valley	11	3.21	127	+0.7	+ 1.1
Northern Slope	7	1.33	143	+0.4	+ 0.5
Middle Slope	6	2.42	141	+0.7	+ 2.7
Southern Slope	6	4.49	188	+2.1	+ 3.2
Southern Plateau	13	1.05	123	+0.2	− 1.4
Middle Plateau	8	0.49	71	−0.2	− 1.6
Northern Plateau	12	0.47	40	−0.7	− 1.0
North Pacific	7	2.25	65	−1.0	+ 2.0
Middle Pacific	5	0.03	4	−0.7	+ 0.7
South Pacific	4	T.	0	−0.1	− 0.5

In Canada.—Professor Stupart says:

Precipitation was above the average in British Columbia to an amount varying from 0.2 to 0.8 of an inch. In the Territories, Manitoba, and over the western half of the Lake Superior region it was below the average, and in nearly all localities to a marked extent except at Calgary, where there was an excess of 0.2 inch. Battleford and Medicine Hat recorded, respectively, 1 inch below; Swift Current, 0.6 inch below; Minnedosa, 0.8 inch below; Port Arthur, 1.4 inches below. From the eastern portion of the Lake Superior region to the Maritime Provinces the rainfall was above the average, except in a few localities, more especially in a portion of eastern Ontario, where negative departures occurred of 1.5 inches at Kingston and 1.6 inches at Ottawa, and in Cape Breton and Prince Edward Island where there was a deficiency varying from a half to three-quarters of an inch. The chief positive departures were: Port Stanley, 2.4 inches; Parry Sound, 1.5 inches; Owen Sound, 2.9 inches; Quebec, 0.7 inch; Chatham, 1.4 inches.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 4, 15, 20. Arkansas, 1, 11. California, 19. Colorado, 17, 18, 20, 21, 26, 28. Idaho, 25, 27. Indiana, 13, 30. Iowa, 2, 3, 5, 8, 20, 27. Kansas, 26. Maryland, 3. Michigan, 1, 3, 6, 8, 11, 12, 13. Minnesota, 3, 8, 26. Missouri, 26. Nebraska, 2. Nevada, 14, 19. New Hampshire, 9. New Mexico, 1, 4, 18, 20, 28. New York, 4. North Dakota, 6, 20. Ohio, 9, 13, 26. Oklahoma, 26. Oregon, 24. Pennsylvania, 9. Texas, 6, 17, 21. Utah, 15, 16,18, 20. Virginia, 27. Washington, 24, 26, 27. West Virginia, 25. Wisconsin, 3, 5, 8, 17. Wyoming, 16.

SLEET.

The following are the dates on which sleet fell in the respective States:

Colorado, 11, 21, 22, 26. Montana, 16. Nebraska, 26. South Dakota, 11. Wyoming 11, 20.

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	84	+ 2	Missouri Valley	65	— 2
Middle Atlantic	79	+ 2	Northern Slope	58	+ 5
South Atlantic	81	0	Middle Slope	63	+ 5
Florida Peninsula	81	— 1	Southern Slope	62	0
East Gulf	79	+ 2	Southern Plateau	42	— 5
West Gulf	77	+ 3	Middle Plateau	38	+ 1
Ohio Valley and Tennessee	76	+ 3	Northern Plateau	47	— 5
Lower Lake	77	+ 3	North Pacific	75	— 6
Upper Lake	79	+ 3	Middle Pacific	59	— 3
North Dakota	63	— 2	South Pacific	70	+ 5
Upper Mississippi Valley	76	+ 4			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.8	+ 0.8	Missouri Valley	4.2	+ 0.2
Middle Atlantic	5.2	+ 0.4	Northern Slope	4.1	+ 0.1
South Atlantic	5.0	+ 0.2	Middle Slope	3.8	+ 0.6
Florida Peninsula	5.1	— 0.4	Southern Slope	4.0	+ 0.4
East Gulf	6.1	+ 1.7	Southern Plateau	2.5	+ 0.2
West Gulf	4.3	0.0	Middle Plateau	2.5	0.0
Ohio Valley and Tennessee	5.4	+ 1.0	Northern Plateau	3.6	— 0.5
Lower Lake	5.4	+ 0.6	North Pacific	4.3	— 0.6
Upper Lake	6.3	+ 1.2	Middle Pacific	3.2	+ 0.4
North Dakota	4.0	— 0.3	South Pacific	2.9	+ 0.4
Upper Mississippi Valley	5.3	+ 1.1			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Bismarck, N. Dak	7	60	n.	North Head, Wash	26	60	s.
Buffalo, N. Y	13	51	sw.	Port Reyes Light, Cal	19	61	nw.
Chicago, Ill	8	52	sw.	Do	24	64	nw.
Columbia, S. C	30	53	sw.	Do	25	59	nw.
Mount Tamalpais, Cal	19	60	nw.	Do	27	69	nw.
Do	24	75	nw.	Do	28	66	nw.
Do	27	56	nw.	Syracuse, N. Y	9	58	se.
Do	28	58	nw.	Williston, N. Dak	25	50	nw.
New York, N. Y	9	58	nw.				

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 2,641 thunderstorms were received during the current month as against 2,629 in 1901 and 6,524 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 5th, 160; 26th, 151; 27th, 136; 1st, 131.

Reports were most numerous from: Florida, 216; Texas, 187; Missouri, 171; Illinois, 132.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 13th to 21st.

In Canada: Thunderstorms were reported as follows: Sydney, 2; Grand Manan, 2; Quebec, 1, 4, 7, 23; Ottawa, 23; Toronto, 3; White River, 17; Port Stanley, 7, 9, 28; Saugeen, 7; Parry Sound, 1, 3, 6, 9; Port Arthur, 16; Prince Albert, 7; Hamilton, Bermuda, 23, 30. Auroras were reported from White River, Ont., on the 2d and 5th.

DESCRIPTION OF TABLES AND CHARTS.

By W. B. STOCKMAN, Forecast Official, in charge of Divison of Records and Meteorological Data.

For description of tables and charts see page 413 of REVIEW for August, 1902.

TABLE I.—*Climatological data for Weather Bureau Stations, September, 1902.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.				
New England.							61.0	+ 0.3									84	3.48	+ 0.3									5.9	
Eastport	76	69	74	30.02	30.10	+ .07	56.8	+ 1.0	78	2	64	37	25	50	23	53	50	82	2.43	− 0.8	11	5,530	sw.	40	e.	10	13	8	9	4.7	
Portland, Me.	103	81	117	29.96	30.08	+ .03	59.0	− 0.7	82	2	65	42	25	53	22	55	52	82	4.08	+ 1.0	12	5,579	s.	36	se.	9	10	5	15	6.1	
Northfield	876	15	65	29.14	30.09	+ .03	56.8	+ 0.8	84	1	67	31	15	46	33	54	52	88	3.31	+ 0.6	15	5,054	s.	30	se.	9	6	10	14	6.4	
Boston	125	115	181	29.94	30.08	+ .01	62.6	+ 0.2	89	1	69	47	15	56	22	59	56	81	2.08	− 0.8	11	6,614	e.	28	s.	9	10	5	15	5.9	
Nantucket	12	43	85	30.06	30.07	− .01	63.1	+ 0.4	77	8	67	51	26	59	15	60	58	86	2.35	− 1.0	13	9,481	e.	36	se.	13	7	10	13	6.1	
Block Island	31	11	60	30.04	30.07	− .01	63.6	0.0	75	8	68	48	16	59	18	60	58	85	3.96	+ 1.0	16	10,818	ne.	36	nw.	14	9	8	13	5.8	
New Haven	106	117	140	29.94	30.05	− .02	63.0	− 0.5	84	2	71	45	6	55	25	59	57	84	5.84	+ 2.1	14	6,074	n.	32	se.	9	11	5	14	5.5	
Mid. Atlantic States.							66.5	− 0.5									79	4.82	+ 1.0									5.2	
Albany	97	102	115	29.97	30.07	.00	63.0	− 0.1	86	1	72	41	15	54	28	57	54	80	4.15	+ 0.7	13	4,485	s.	36	se.	9	13	4	13	5.6	
Binghamton	875	79	90	29.12	30.05	− .02	60.8	− 0.2	86	1	71	36	6	51	34	.....	.....	.....	4.75	+ 1.4	13	3,809	se.	30	w.	9	8	13	9	5.8	
New York	314	108	350	29.72	30.05	− .03	65.9	0.0	86	1	72	50	15	60	18	61	58	80	3.59	− 0.1	17	8,595	ne.	58	nw.	9	9	4	17	6.2	
Harrisburg	374	94	104	29.63	30.03	− .05	64.3	− 0.1	89	1	74	42	15	55	30	58	55	75	4.01	− 0.1	10	4,157	e.	39	nw.	9	11	9	10	5.3	
Philadelphia	117	168	184	29.93	30.05	− .03	67.1	0.0	88	1	75	50	15	60	23	61	57	76	4.97	+ 1.7	13	6,591	ne.	32	s.	9	10	7	13	5.8	
Scranton	805	111	119	29.19	30.05	− .02	62.0	.....	88	1	72	35	15	52	34	57	54	78	6.23	.....	12	4,513	ne.	32	nw.	9	10	7	13	5.7	
Atlantic City	52	39	48	29.99	30.05	− .02	66.5	− 0.2	81	8	72	49	14	61	18	64	62	87	5.32	+ 1.8	13	5,835	s.	36	s.	9	9	11	10	5.4	
Cape May	17	47	51	30.04	30.07	.00	67.2	− 0.9	78	1	73	52	14	62	18	63	.....	.....	6.55	+ 3.1	16	5,315	n.	31	s.	9	10	9	11	5.4	
Baltimore	123	68	82	29.90	30.03	− .05	67.2	− 0.7	92	1	76	48	14	59	26	62	59	78	7.19	+ 3.3	12	4,754	nw.	36	nw.	9	10	9	11	5.6	
Washington	112	59	76	29.92	30.04	− .04	66.8	− 1.0	91	1	76	43	15	57	29	62	59	81	5.30	+ 1.6	12	3,683	nw.	29	nw.	9	13	14	3	4.0	
Cape Henry	.....	5	58	30.00	30.03	− .03	71.1	− 0.7	90	2	76	60	10	66	22	.....	.....	.....	4.69	+ 0.1	12	9,440	n.	43	n.	14	15	8	7	4.2	
Lynchburg	681	83	88	29.31	30.04	− .04	67.3	− 1.7	91	1	78	42	15	56	33	60	57	78	2.48	− 1.3	11	2,542	se.	19	nw.	9	15	7	8	4.1	
Norfolk	91	102	111	29.94	30.04	− .02	70.5	− 0.6	87	2	77	54	19	64	22	65	63	81	4.82	+ 0.3	11	5,873	s.	33	nw.	9	12	10	8	4.9	
Richmond	144	82	90	29.90	30.03	− .02	68.6	.....	88	1	78	48	15	59	26	.....	.....	.....	4.91	.....	8	3,071	n.	25	sw.	9	11	7	12	5.5	
S. Atlantic States.							73.4	− 0.8									81	4.54	− 0.8									5.0	
Asheville	2,255	73	100	27.74	30.08	+ .01	63.3	.....	86	1	74	38	14	53	34	58	56	85	6.21	.....	12	3,711	se.	36	n.	9	8	13	9	5.2	
Charlotte	773	68	76	29.22	30.05	− .02	70.0	− 1.1	89	2	79	48	14	61	24	63	60	76	3.48	+ 0.1	10	4,021	ne.	26	w.	9	9	12	9	5.1	
Hatteras	11	12	47	30.02	30.03	− .03	73.2	− 0.5	86	4	78	61	19	69	13	68	67	85	5.12	− 1.3	13	9,057	ne.	36	n.	10	11	9	10	4.8	
Raleigh	376	93	101	29.64	30.03	− .04	70.2	− 0.3	90	3	80	49	15	61	25	63	60	76	2.92	− 0.3	10	3,942	ne.	22	nw.	30	13	7	10	4.8	
Wilmington	78	82	90	29.93	30.01	− .04	72.4	− 1.2	88	4	80	55	18	65	21	66	64	82	3.57	− 2.8	11	5,111	ne.	30	sw.	9	10	9	11	5.3	
Charleston	48	14	92	29.98	30.03	− .01	75.3	− 0.7	90	27	81	63	10	70	20	69	67	81	3.73	− 2.9	12	7,354	ne.	31	ne.	5	4	20	6	5.7	
Columbia	351	114	122	29.66	30.03	− .02	72.4	− 2.6	90	2	81	54	15	64	25	65	62	76	2.86	− 1.3	10	5,198	ne.	53	sw.	30	8	14	8	5.3	
Augusta	180	89	97	29.83	30.01	− .04	74.0	− 0.4	91	3	83	53	16	65	28	66	62	74	2.33	− 1.6	9	4,167	ne.	38	nw.	27	17	9	4	3.7	
Savannah	65	79	89	29.95	30.01	− .02	76.4	+ 0.6	90	4	83	62	15	69	19	70	69	87	3.83	− 2.3	12	4,920	ne.	24	n.	4	9	15	6	4.9	
Jacksonville	43	101	129	29.94	29.99	− .01	77.4	− 0.2	91	4	84	65	15	71	18	73	71	88	12.78	+ 4.4	17	6,316	ne.	38	s.	9	3	13	14	6.8	
Florida Peninsula.							81.3	+ 0.7									81	6.51	− 1.8									5.1	
Jupiter	28	10	30	29.96	29.98	+ .02	81.2	+ 1.6	93	4	88	72	*	75	18	76	74	82	6.01	− 3.5	20	4,353	s.	25	sw.	21	5	21	4	5.3	
Key West	22	43	50	29.95	29.97	+ .03	82.9	+ 0.4	90	23	88	72	5	78	15	76	73	73	3.37	− 4.1	11	4,098	e.	26	w.	4	16	13	1	3.2	
Tampa	34	60	67	29.95	29.98	+ .01	79.7	+ 0.1	91	7	87	69	11	72	20	74	73	87	10.14	+ 2.2	19	3,563	ne.	30	s.	8	4	13	13	6.7	
East Gulf States.							75.8	− 0.1									79	6.25	+ 2.0									6.1	
Atlanta	1,174	190	216	28.80	30.02	− .03	70.2	− 1.3	88	2	78	48	14	62	24	63	59	76	5.37	+ 1.6	12	7,791	e.	44	w.	27	8	10	12	5.6	
Macon	370	93	99	29.63	30.03	.00	73.4	.....	91	3	82	53	14	65	26	.....	.....	.....	2.38	.....	10	4,446	ne.	30	w.	27	8	5	17	6.5	
Pensacola	56	78	96	29.92	29.98	− .01	77.7	+ 0.2	91	9	83	58	14	72	21	.....	.....	.....	8.04	+ 3.2	13	6,798	ne.	37	s.	8	6	12	12	6.4	
Mobile	57	88	96	29.91	29.98	− .02	76.9	+ 0.1	90	9	84	52	14	70	28	71	69	82	4.60	− 0.6	15	4,698	n.	26	n.	9	6	13	11	6.0	
Montgomery	223	100	112	29.75	29.98	− .04	75.4	− 0.2	93	2	85	48	14	66	30	67	64	75	2.94	0.0	11	4,974	e.	40	w.	27	9	11	10	5.6	
Meridian	375	84	93	29.59	29.97	− .05	73.0	0.0	89	1	82	43	14	64	35	.....	.....	.....	7.14	+ 4.3	10	3,678	ne.	24	w.	27	9	10	11	5.6	
Vicksburg	247	62	74	29.68	29.94	− .08	73.6	− 1.7	91	7	83	48	15	64	34	67	64	81	6.47	+ 3.0	14	4,237	e.	26	w.	27	13	5	12	5.0	
New Orleans	51	88	121	29.90	29.95	− .03	78.8	+ 0.5	94	9	86	55	14	72	21	72	69	81	6.68	+ 2.1	14	5,385	ne.	28	nw.	3	5	9	16	6.5	
Port Eads	.....	27	.....	29.92	29.93	.....	81.2	+ 1.4	93	*	87	66	15	75	20	76	.....	.....	8.79	+ 2.8	16	.....	ne.	.....	.....	.....	0	14	16	7.3	
West Gulf States.							74.8	− 1.2									77	4.96	+ 1.0									4.3	
Shreveport	249	77	84	29.70	29.96	− .04	73.6	− 1.9	93	8	83	50	14	64	30	66	63	79	4.33	+ 0.6	11	4,281	se.	32	n.	12	12	10	8	4.8	
Fort Smith	457	79	94	29.49	29.96	− .05	68.6	− 3.7	91	8	79	42	13	58	33	60	56	72	3.21	− 0.3	11	6,059	e.	46	nw.	5	10	17	3	4.1	
Little Rock	357	93	100	29.61	29.98	− .05	69.7	− 3.2	90	8	78	46	15	61	29	62	58	74	5.75	+ 2.6	11	4,334	ne.	32	w.	22	13	9	8	4.4	
Corpus Christi	20	48	53	29.90	29.92	− .03	80.3	+ 1.5	92	9	86	61	30	74	19	74	72	82	3.63	− 1.1	8	7,228	se.	37	n.	23	11	13	6	4.5	
Fort Worth	670	106	114	29.28	29.97	− .02	72.8	.....	96	11	84	48	14	62	38	.....	.....	.....	2.40	.....	5	7,513	se.	48	ne.	6	16	10	4	3.0	
Galveston	54	106	112	29.86	29.92	− .06	79.0	− 0.5	90	9	83	61	13	75	18	74	71	80	7.11	+ 0.9	9	7,279	se.	35	n.	17	11	12	7	5.4	
Palestine	510	73	79	29.44	29.96	− .03	73.7	− 2.0	93	1	83	48	14	64	31	67	65	83	5.14	+ 1.9	13	4,211	ne.	18	n.	17	11	10	9	5.0	
San Antonio	701	80	91	29.21	29.92	− .04	78.6	+ 1.1	99	8	89	55	14	68	33	68	63	67	5.52	+ 2.1	9	5,204	se.	32	n.	6	12	15	3	3.9	
Taylor	583	55	63	29.34	29.96	− .01	75.7	.....	97	1	86	50	14	65	31	.....	.....	.....	7.27	.....	9	5,936	n.	46	e.	17	10	16	4	4.0	
Ohio Val. and Tenn.							67.3	− 1.3									76	3.79	+ 0.9									5.4	
Chattanooga	762	106	112	29.24	30.04	− .02	69.7	− 1.0	87	23	79	47	15	60	32	62	58	73	3.59	− 0.1	13	4,239	ne.	36	w.	12	9	11	10	5.3	
Knoxville	1,004	10	88	28.98	30.04	− .02	67.9	− 1.4	87	8	78	42	14	58	32	62	60	83	8.04	+ 5.3	14	3,598	ne.	36	w.	30	7	16	7	5.6	
Memphis	397	140	154	29.58	30.00	− .03	70.2	− 1.9	88	8	78	46	14	62	27	65	62	81	2.67	− 0.4	10	6,114	n.	35	w.	30	16	5	9	4.5	
Nashville	546	122	131	29.44	30.02	− .04	69.2	− 1.5	91	8	80	41	14	59	33	61	56	71	2.82	− 1.2	13	4,159	se.	29	nw.	9	14	7	9	4.7	
Lexington	989	75	102	28.97	30.02	− .05	67.0	− 1.1	86	8	76	43	14	58	28	.....	.....	.....	2.60	+ 0.1	10	5,595	se.	35	nw.	9	10	13	7	4.8	
Louisville	525	114	136	29.44	30.02	− .04	68.1	− 1.3	91	8	78	40	14	58	33	60	56	74	4.03	+ 1.2	11	4,548	sw.	32	nw.	9	11	5	14	5.8	
Evansville	431	72	82	29.53	29.99	− .07	67.4	.....	88	8	77	41	14	58	30	.....	.....	.....	2.80	.....	8	4,222	e.	25	w.	30	9	10	11	5.4	
Indianapolis	822	154	164	29.13	30.02	− .04	64.4	− 1.6	85	1	74	39	14	55	28	57	52	71	5.33	+ 2.4	10	6,165	s.	36	sw.	27	8	13	9	5.5	
Cincinnati	628	152	157	29.34	30.02	− .05	66.6	− 1.5	88	8	76	41	14	57	32	59	54	72	4.26	+ 1.8	11	4,003	se.	28	w.	27	9	7	14	5.7	
Columbus	824	87	100	29.14	30.02	− .05	65.2	− 0.9	86	8	75	38	14	55	29	58	55	76	4.16	+ 1.6	12	6,175	se.	42	nw.	9	11	7	12	5.7	
Pittsburg	842	116	123	29.13	30.02	− .06	66.2	− 0.5	86	23	75	44	15	57	28	58	54	70	2.21	− 0.4	11	3,658	nw.	22	nw.	9	13	7	10	4.6	
Parkersburg	638	77	84	29.36	30.05	− .03	66.2	− 2.0	89	23	77	40	14	56	34	60	57	78	2.03	− 0.8	12	2,883	se.	34	nw.	9	6	11	13	6.3	
Elkins	1,940	41	50	28.02	30.05	− .01	60.8	.....	85	8	75	35	17	47	41	54	53	89	4.81	.....	13	2,141	n.	39	w.	9	4	13	13	6.4	
Lower Lake Region.							63.0	− 0.1									77	4.40	+ 1.4									5.4	
Buffalo	767	178	206	29.18	30.01	− .05	64.2	+ 2.1	82	21	72	46	5	57	29	57	54	73	2.73	− 0.6	15	8,909	w.	51	sw.	13	6	11	13	6.4	
Oswego	335	76	91	29.66	30.02	− .04	61.6	− 0.1	81	8	70	41	6	53	31	56	53	77	2.57	− 0.2	13	7,009	s.	31	s.	9	11	11	8	5.1	
Rochester	523	81	90	29.46	30.03	− .03	63.2	+ 1.2	84	8	73	41	15	54	33	57	53	75	1.99	− 0.4	12	5,293	sw.	29	w.	9	11	7	12	5.7	
Syracuse	597	97	113	29.40	30.05	− .02	62.0	.....	82	1	71	41	15	53	27	.....	.....	.....	1.55	.....	14	7,823	s.	58	se.	9	10	11	9	5.5	
Erie	713	92	102	29.24	30.01	− .05	63.9	+ 0.3	84	8	72	44	15	56	26	57	54	76	3.36	− 0.6	11	7,568	s.	36	nw.	9	13	5	12	5.7	
Cleveland	762	190	201	29.18	29.99	− .07	62.9	− 0.9	82	8	71	42	15	54	29	58	55	80	5.36	+ 1.9	15	9,116	se.	48	nw.	9	11	9	10	5.2	
Sandusky	629	62	70	29.32	30.00	− .06	63.6	− 1.5	85	8	72	40	14	56	28	.....	.....	.....	6.20	+ 3.4	15	4,991	s.	34	nw.	3	14	9	7	4.2	
Toledo	628	123	127	29.33	30.01	− .05	62.6	− 1.3	83	8	71	39	14	54	25	56	53	79	6.51	+ 4.1	14	5,960	sw.	30	ne.	24	10	9	11	5.5	
Detroit	730	153	193	29.20	30.00	− .06	62.2	− 0.7	83	1	70	40	14	54	24	57	54	81	6.50	+ 4.0	17	7,201	sw.	31	nw.	3	10	8	12	5.7	
Upper Lake Region.							57.3	− 1.8									79	3.24	− 0.2									6.3	
Alpena	609	63	80	29.32	29.99	− .04	57.2	0.0	78	8	63	37	14	50	30	52	49	81	2.44	− 1.3	14	7,456	se.	37	s.	6	5	6	19	7.1	
Escanaba	612	43	57	29.29	29.96	− .05	54.8	− 1.9	77	7	62	36	12	47	25	51	48	80	1.62	− 2.0	8	7,105	s.	35	sw.	8	3	14	11	5.9	
Grand Haven	632	54	92	29.29	29.96	− .08	59.0	− 1.9	79	17	66	40	13	52	29	55	52	79	5.23	+ 1.7	12	8,115	sw.	37	sw.	6	7	10	13	6.4	
Houghton	668	66	74	29.18	29.90	− .10	55.6	.....	79	16	63	37	13	48	25	.....	.....	.....	2.59	.....	15	5,447	w.	33	nw.	3	7	7	16	6.4	
Marquette	734	79	116	29.14	29.96	− .04	54.8	− 2.0	75	14	62	39	12	48	27	49	45	75	1.29	− 2.7	14	8,503	nw.	39	sw.	8	5	14	11	6.4	
Port Huron	638	70	120	29.32	30.02	− .04	60.3	− 0.9	81	1	69	37	14	52	25	56	53	84	6.27	+ 3.7	13	7,326	s.	35	nw.	3	6	10	14	6.5	
Sault Ste. Marie	614	40	61	29.28	29.94	− .08	55.2	− 0.3	76	17	63	36	12	48	29	51	48	80	2.44	− 2.0	13	5,381	se.	31	nw.	4	6	9	15	6.3	
Chicago	823	241	274	29.11	29.99	− .05	60.8	− 3.4	81	8	68	42	13	54	30	55	52	78	4.83	+ 2.0	9	11,834	s.	52	sw.	8	9	8	13	5.8	
Milwaukee	681	124	142	29.28	30.00	− .03	59.0	− 2.2	81	8	67	39	13	51	29	53	50	80	4.27	+ 1.4	11	8,334	w.	38	se.	5	6	9	15	6.4	
Green Bay	617	49	57	29.30	29.96	− .06	57.6	− 2.9	79	7	66	36	13	49	30	52	48	76	2.63	− 0.7	8	8,138	sw.	40	sw.	6	5	12	13	6.7	
Duluth	702	93	116	29.16	29.93	− .05	53.2	− 3.0	78	7	60	38	18	46	28	48	44	75	1.52	− 2.3	15	6,769	ne.	35	nw.	27	7	14	9	5.9	
North Dakota.							54.5	− 1.9									63	0.49	− 0.9									4.0	
Moorhead	935	54	60	28.92	29.94	− .02	54.2	− 2.3	88	7	66	28	12	42	46	46	42	71	0.74	− 1.4	5	7,782	nw.	40	se.	25	13	10	7	4.9	
Bismarck	1,674	16	29	28.17	29.94	.00	55.6	− 1.4	92	25	70	29	12	41	44	46	39	63	0.41	− 0.8	3	8,244	nw.	60	n.	7	22	3	5	3.3	
Williston	1,878	14	34	27.92	29.90	− .03	53.6	− 1.9	86	24	69	18	17	38	46	43	34	56	0.33	− 0.5	3	8,301	n.	50	nw.	25	19	7	4	3.8	

TABLE I.—*Climatological data for Weather Bureau Stations, September, 1902*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				
Upper Miss. Valley.							**61.4**	**— 3.6**										**76**	**3.10**	**— 0.1**									**5.3**	
Minneapolis		99	208				57.2	— 5.0	82	7	66	36	18	48	32	....	....	....	4.03	+ 1.5	11	9,706	s.	34	se.	19	8	9	13	....	
St. Paul	837	114	124	29.04	29.94	— .05	57.2	— 2.6	82	7	66	36	13	49	32	50	45	72	3.16	+ 0.2	11	6,130	nw.	28	s.	16	9	10	11	5.7	
La Crosse	714	71	87	29.20	29.97	— .04	58.8	— 2.8	81	7	68	32	13	50	33	....	....	....	2.97	— 1.2	10	5,941	s.	26	nw.	6	12	9	9	4.8	
Davenport	606	71	79	29.32	29.96	— .07	61.0	— 3.7	83	7	70	36	13	52	27	55	52	78	3.20	— 0.0	10	5,351	w.	24	sw.	5	10	7	13	5.4	
Des Moines	861	84	88	29.07	29.99	— .03	59.8	— 4.3	83	7	70	35	13	50	32	54	49	74	5.03	+ 1.8	8	6,664	sw.	31	sw.	14	9	10	11	5.8	
Dubuque	698	100	117	29.23	29.98	— .05	59.6	— 3.6	81	7	69	36	13	50	32	53	49	74	3.93	— 0.2	13	5,179	se.	26	se.	5	10	8	12	6.1	
Keokuk	614	63	78	29.31	29.97	— .06	62.4	— 4.0	85	7	72	36	13	53	32	55	52	79	1.82	— 1.7	10	5,311	nw.	28	w.	5	14	5	11	4.5	
Cairo	356	87	93	29.62	30.00	— .05	67.4	— 2.5	87	8	76	44	13	59	28	61	58	78	3.29	+ 0.7	12	4,117	sw.	35	nw.	9	10	9	11	5.1	
Springfield, Ill.	644	82	93	29.31	30.00	— .05	62.5	— 3.9	84	7	72	38	13	53	34	56	53	77	2.30	— 0.9	12	5,950	s.	30	nw.	8	10	7	13	5.7	
Hannibal	534	75	110	29.41	29.97	— .06	62.6	— 4.1	84	7	73	34	13	52	32	....	....	....	2.36	— 0.7	11	6,033	sw.	33	sw.	27	14	6	10	4.8	
St. Louis	567	111	210	29.38	29.98	— .06	66.4	— 3.0	86	7	75	45	13	58	34	59	55	73	1.98	— 1.1	11	5,735	s.	43	n.	8	13	5	12	5.1	
Missouri Valley.							**61.0**	**— 4.2**										**65**	**3.21**	**+ 0.7**									**4.2**	
Columbia	784	11	84	29.16	29.98	— .05	62.4	— 7.1	85	7	74	33	13	51	34	....	....	....	2.60	— 0.7	13	5,078	se.	36	w.	5	13	8	9	4.8	
Kansas City	963	78	95	28.97	30.00	— .02	63.8	— 3.7	85	26	73	40	13	55	30	56	51	71	5.23	+ 1.8	12	5,941	se.	28	nw.	30	16	3	11	4.4	
Springfield, Mo	1,324	98	104	28.60	30.00	— .03	63.4	— 4.3	84	7	73	38	13	54	29	57	54	78	4.47	+ 0.7	14	7,221	se.	33	n.	9	19	4	7	3.8	
Topeka	....	81	89	....	....	....	63.0	— 5.7	86	7	74	39	13	52	33	....	....	....	3.56	+ 0.2	8	6,630	s.	36	w.	26	13	8	9	4.5	
Lincoln	1,189	75	84	28.68	29.94	— .05	61.6	— 4.5	87	7	72	35	12	51	37	53	48	67	4.10	+ 2.1	11	8,556	se.	32	nw.	26	16	7	7	4.0	
Omaha	1,105	115	121	28.79	29.96	— .04	62.0	— 2.8	86	7	71	39	12	53	32	53	48	66	1.52	— 1.4	9	6,603	s.	32	n.	8	12	8	10	4.9	
Valentine	2,598	47	54	27.24	29.94	— .02	57.5	— 4.1	97	7	72	25	12	43	46	47	38	54	0.25	— 0.7	4	8,779	nw.	43	s.	4	17	8	5	3.4	
Sioux City	1,135	96	164	28.75	29.96	— .02	59.9	— 5.3	86	7	71	30	13	49	42	....	....	....	4.49	+ 2.4	6	9,870	nw.	41	nw.	8	13	5	12	4.8	
Pierre	1,572	43	50	28.28	29.94	— .01	60.4	— 3.3	96	7	74	31	12	47	44	48	39	55	0.70	— 0.3	4	6,325	se.	37	nw.	8	19	7	4	3.1	
Huron	1,306	56	67	28.56	29.96	— .00	56.8	— 3.3	94	7	71	25	12	42	49	48	41	64	0.19	— 1.2	2	9,108	se.	44	s.	25	19	6	5	3.9	
Yankton	1,233	42	49	28.64	29.95	— .03	59.9	— 2.2	93	7	72	27	18	48	43	....	....	....	8.17	+ 5.3	6	5,899	nw.	27	s.	5	14	9	7	4.6	
Northern Slope.							**56.7**	**— 1.4**										**58**	**1.33**	**+ 0.4**									**4.1**	
Havre	2,505	46	53	27.32	29.94	.00	55.5	+ 0.6	86	24	71	27	21	40	47	47	41	66	0.42	— 0.8	6	7,467	sw.	48	sw.	4	12	15	3	4.6	0.5
Miles City	2,371	42	50	27.44	29.92	— .03	58.5	— 1.5	90	4	72	30	17	45	47	52	49	78	0.47	— 0.3	4	4,981	s.	44	nw.	7	15	11	4	4.1	
Helena	4,110	88	94	29.82	29.98	+ .01	55.3	— 0.5	86	6	68	32	17	43	37	42	30	44	0.39	— 0.8	5	5,541	sw.	32	w.	4	12	8	10	5.2	T.
Kalispell	2,965	45	51	26.94	29.99	+ .03	50.8	....	81	6	64	30	18	38	44	43	35	60	0.76	.....	7	4,262	w.	33	sw.	4	13	10	7	4.3	
Rapid City	3,234	46	50	26.59	29.92	— .04	59.3	— 2.1	94	7	74	32	13	45	48	46	34	46	0.43	— 0.1	3	7,189	nw.	38	nw.	7	22	6	2	2.6	
Cheyenne	6,088	56	64	24.06	29.98	+ .02	54.0	— 2.2	86	4	69	22	12	39	48	42	31	49	3.52	+ 2.6	5	7,205	nw.	43	nw.	26	14	10	6	4.2	
Lander	5,372	26	36	24.68	29.99	+ .03	54.2	— 1.6	85	7	71	24	17	37	52	43	34	56	0.75	— 0.1	3	2,513	ne.	27	ne.	16	14	13	3	3.8	T.
North Platte	2,821	43	52	27.07	29.97	.00	59.9	— 2.5	97	7	74	30	12	46	45	50	43	61	3.34	+ 2.1	4	6,687	nw.	34	nw.	26	15	13	2	3.7	
Middle Slope.							**63.7**	**— 4.0**										**63**	**2.42**	**+ 0.7**									**3.8**	
Denver	5,291	79	151	24.77	29.96	.00	61.0	— 0.9	93	7	76	31	12	46	45	47	37	51	3.70	+ 2.9	4	5,579	s.	40	nw.	20	16	8	6	4.0	T.
Pueblo	4,685	80	86	25.30	29.94	— .02	61.7	— 3.5	95	7	77	32	13	48	48	48	37	49	0.48	+ 0.1	2	5,239	se.	36	ne.	3	20	5	5	3.2	
Concordia	1,398	42	47	28.50	29.96	— .03	63.0	— 4.8	90	7	74	36	13	52	39	55	51	72	3.14	+ 0.7	9	6,147	s.	27	nw.	26	16	6	8	3.9	
Dodge	2,509	44	52	27.38	29.95	— .03	64.5	— 3.1	93	7	78	35	30	51	41	53	46	63	0.60	— 0.8	4	10,000	se.	42	nw.	26	15	13	2	3.5	
Wichita	1,358	78	85	28.57	29.99	— .01	64.8	— 5.2	89	5	76	41	12	54	34	56	51	71	2.69	— 0.2	9	6,318	s.	34	n.	26	17	5	8	3.9	
Oklahoma	1,214	79	86	28.70	29.96	— .03	67.4	— 6.4	94	8	78	45	27	57	35	59	54	72	3.92	+ 1.3	8	8,471	s.	43	n.	8	15	5	10	4.3	
Southern Slope.							**69.4**	**— 1.6**										**62**	**2.04**	**— 0.4**									**4.0**	
Abilene	1,738	45	54	28.16	29.94	— .02	72.8	— 1.8	98	8	83	50	30	62	35	62	57	65	3.13	+ 0.7	7	6,556	se.	30	nw.	26	13	9	8	4.7	
Amarillo	3,676	43	52	26.26	29.94	— .02	66.0	— 1.4	93	10	79	39	30	54	40	54	47	60	0.95	— 1.6	4	9,168	s.	36	ne.	26	18	9	3	3.4	
Southern Plateau.							**72.0**	**+ 0.9**										**42**	**1.08**	**+ 0.4**									**2.5**	
El Paso	3,762	10	110	26.17	29.86	— .02	73.0	— 0.1	93	8	85	53	13	61	34	59	52	57	1.86	+ 0.8	10	6,315	e.	47	e.	6	17	9	4	3.3	
Santa Fe	7,013	47	50	23.33	29.91	— .02	60.0	+ 0.1	83	8	71	37	27	49	32	47	37	50	2.05	+ 0.6	8	4,386	se.	25	ne.	20	23	6	1	2.1	
Flagstaff	6,907	12	25	23.41	29.88	— .01	57.4	— 1.0	86	9	74	22	29	41	44	45	....	....	1.12	+ 0.2	6	.....	nw.	....	.....	...	17	8	5	3.3	
Phoenix	1,108	50	56	28.67	29.79	— .02	83.6	+ 2.8	109	6	98	54	21	69	37	64	51	40	1.46	+ 0.8	7	2,905	e.	32	w.	13	19	10	1	2.5	
Yuma	141	16	50	29.61	29.75	— .03	85.3	+ 0.6	110	6	100	55	30	71	44	66	54	42	T.	— 0.2	0	4,410	sw.	28	n.	26	25	4	1	0.9	
Independence	3,910	51	58	25.96	29.87	+ .01	72.8	+ 2.8	97	8	86	45	26	60	31	50	26	20	T.	— 0.1	0	5,558	nw.	44	nw.	20	19	5	6	3.0	
Middle Plateau.							**62.5**	**— 0.2**										**38**	**0.44**	**— 0.2**									**2.5**	
Carson City	4,720	82	92	25.31	29.94	— .01	61.0	+ 1.5	92	9	79	25	26	43	50	47	35	44	0.12	— 0.2	1	3,827	sw.	36	sw.	12	19	8	3	2.9	
Winnemucca	4,344	59	70	25.64	29.98	+ .05	59.2	— 0.9	92	2	78	22	29	41	48	47	37	47	0.72	+ 0.4	3	4,897	ne.	37	sw.	19	22	4	4	2.1	
Modena	5,479	10	38	24.64	29.92	.00	62.2	.....	92	7	79	28	29	45	45	44	24	31	0.76	.....	2	7,609	sw.	47	s.	19	22	7	1	1.9	
Salt Lake City	4,366	105	110	25.62	29.93	— .02	64.1	— 0.2	92	3	77	35	29	52	35	47	30	32	0.05	— 0.9	2	4,850	se.	33	nw.	18	20	5	5	2.9	
Grand Junction	4,608	43	51	25.37	29.93	— .02	65.7	— 1.0	94	7	81	39	28	50	44	47	31	35	0.85	— 0.1	2	3,796	se.	26	sw.	28	22	5	3	2.5	
Northern Plateau.							**60.6**	**+ 0.4**										**47**	**0.36**	**— 0.4**									**3.6**	
Baker City	3,471	53	58	26.47	30.03	+ .04	57.0	+ 1.2	91	6	72	30	29	42	42	44	30	42	0.44	— 0.3	2	4,687	nw.	27	nw.	30	12	14	4	4.0	
Boise	2,739	61	68	27.16	30.00	+ .03	62.3	+ 1.5	94	6	78	32	29	47	44	48	34	40	0.03	— 0.4	1	3,012	nw.	15	w.	28	15	12	3	3.4	
Lewiston	757	52	61	29.20	30.00	+ .02	63.4	+ 0.9	94	2	78	35	28	48	44	....	....	....	0.34	— 0.6	3	2,764	e.	30	w.	24	19	6	5	3.0	
Pocatello	4,482	46	54	25.49	29.97	+ .01	59.7	— 0.8	91	2	74	28	26	45	45	44	29	36	0.21	— 0.4	3	6,900	se.	35	w.	4	15	14	1	2.7	1.2
Spokane	1,943	101	110	27.98	30.03	+ .05	58.0	— 0.1	89	3	72	32	28	44	42	46	35	50	0.57	— 0.4	4	4,075	sw.	28	w.	4	13	9	8	4.8	
Walla Walla	1,000	65	73	28.95	30.01	+ .01	63.3	— 0.6	92	3	76	38	28	50	36	56	50	65	0.54	— 0.4	5	3,499	s.	24	sw.	15	20	5	5	3.6	
N. Pac. Coast Reg.							**57.3**	**— 0.1**										**75**	**2.25**	**— 1.0**									**4.3**	
Neah Bay	50	7	50	30.01	30.05	+ .04	53.6	— 1.6	77	11	60	38	21	47	28	50	48	86	3.95	— 3.4	10	6,144	w.	36	sw.	26	15	5	10	4.5	
North Head	211	11	56	29.85	30.07	+ .04	55.2	— 1.8	86	11	60	45	22	50	32	52	50	88	2.48	— 1.2	8	9,652	nw.	60	s.	26	7	6	17	6.7	
Port Crescent	259	13	20	29.81	30.04	+ .02	52.6	— 0.2	78	11	62	32	28	43	33	....	....	....	2.28	— 1.2	8	3,075	w.	16	w.	15	18	3	9	4.2	
Seattle	123	114	151	29.96	30.09	+ .08	58.4	+ 1.2	80	11	66	41	28	50	29	52	47	70	2.15	+ 0.4	9	4,192	se.	31	s.	26	17	7	6	3.6	
Tacoma	213	113	120	29.84	30.07	+ .05	57.0	+ 0.8	77	22	66	36	29	48	34	....	....	....	2.75	+ 0.6	10	3,917	n.	30	sw.	26	10	12	8	5.3	
Astoria	20	57	64	.....	.....	.....	58.1	— 1.1	81	8	67	40	*	50	31	....	....	....	2.28	— 2.4	8	.....	w.	.....	.....	...	20	4	6	3.6	
Portland, Oreg.	154	68	96	29.87	30.03	.00	62.0	+ 1.3	87	2	73	39	28	51	32	54	48	66	1.75	0.0	6	3,923	nw.	24	ne.	8	18	7	5	4.1	
Roseburg	518	56	67	29.46	30.01	— .01	61.5	+ 0.6	90	6	76	36	29	47	42	52	45	63	0.34	— 0.7	3	2,015	n.	19	nw.	7	22	6	2	2.1	
Mid. Pac. Coast Reg.							**64.6**	**+ 1.4**										**59**	**0.03**	**— 0.7**									**3.2**	
Eureka	62	62	80	29.92	30.00	— .01	55.0	— 0.4	70	21	60	44	20	50	22	52	50	85	0.14	— 1.2	2	3,869	n.	44	n.	28	11	8	11	5.1	
Mount Tamalpais	2,375	11	18	27.50	29.92	— .02	69.6	.....	93	1	78	45	24	62	27	51	33	31	0.00	.....	0	11,442	nw.	75	nw.	24	22	6	2	1.9	
Red Bluff	332	50	56	29.52	29.86	— .07	76.3	+ 2.5	108	6	92	50	30	61	42	61	51	46	0.00	— 0.7	0	3,550	se.	34	n.	28	28	2	0	0.8	
Sacramento	69	106	117	29.78	29.86	— .03	70.7	+ 1.2	102	5	85	50	18	56	40	58	50	55	0.00	— 0.4	0	6,092	se.	32	nw.	28	27	3	0	1.0	
San Francisco	155	161	167	29.78	29.96	+ .02	61.9	+ 1.5	83	29	68	51	23	56	24	56	53	78	T.	— 0.3	0	7,759	w.	33	w.	27	13	13	4	3.8	
Point Reyes Light	490	7	30	29.38	29.89	.....	59.0	+ 2.4	78	29	64	50	28	54	21	....	....	....	0.00	— 1.0	0	11,048	nw.	69	nw.	27	10	1	19	6.7	
S. Pac. Coast Reg.							**69.2**	**+ 0.8**										**70**	**T.**	**— 0.1**									**2.9**	
Fresno	330	67	70	29.49	29.84	— .03	76.0	+ 1.5	104	1	92	49	26	60	40	59	45	41	0.00	— 0.2	0	3,524	nw.	19	w.	25	22	7	1	1.9	
Los Angeles	338	74	82	29.53	29.90	+ .02	69.2	+ 0.7	93	26	80	52	26	58	41	61	58	81	T.	— 0.1	0	2,945	w.	14	w.	2	11	18	1	3.7	
San Diego	87	94	102	29.79	29.88	— .01	66.2	— 0.8	73	3	70	56	30	62	17	62	60	84	T.	— 0.1	0	3,614	nw.	20	nw.	12	23	4	3	3.3	
San Luis Obispo	201	46	48	29.72	29.94	+ .01	65.3	+ 1.9	93	26	77	42	30	54	40	56	51	72	0.00	— 0.1	0	3,023	w.	22	n.	26	23	5	2	2.7	
West Indies.																														
Basseterre	29	41	54	29.93	29.96	+ .02	81.5	.....	88	3	86	71	26	76	15	75	73	75	3.43	.....	17	6,069	e.	25	se.	27	12	11	7	4.8	
Bridgetown	30	57	65	29.90	29.93	+ .02	81.9	+ 3.2	89	13	87	74	18	77	13	76	74	77	2.01	— 4.9	15	5,552	e.	25	e.	28	8	11	11	5.9	
Cienfuegos	52	62	67	29.90	29.95	+ .04	80.9	.....	92	7	89	69	2	73	22	74	72	83	5.29	.....	19	3,949	ne.	19	w.	21	9	21	0	4.3	
Grand Turk	11	6	20	29.97	29.98	+ .03	84.4	.....	92	23	91	74	15	78	17	....	....	....	0.21	.....	8	.....	e.	....	.....	...	15	14	1	4.2	
Havana	57	87	105	29.90	29.96	+ .05	81.2	+ 0.5	91	12	88	67	5	74	19	75	74	84	4.73	— 2.0	13	5,699	e.	40	sw.	5	14	16	0	4.0	
Kingston	286	38	52	29.62	29.91	+ .03	80.2	.....	92	24	89	69	25	71	22	73	71	80	2.79	.....	14	4,302	ne.	25	se.	23	5	22	3	5.2	
Port of Spain	40	65	66	29.88	29.92	+ .04	80.2	.....	92	19	88	70	24	72	20	....	....	....	8.21	.....	23	.....	e.	....	.....	...	...	...	...	...	
Puerto Principe	352	55	62	29.62	29.98	+ .07	80.4	.....	93	30	90	68	5	71	23	74	73	86	2.99	.....	14	4,312	ne.	26	e.	12	12	15	3	4.1	
San Juan	82	48	90	29.89	29.97	+ .03	80.4	.....	88	30	86	72	15	75	14	75	73	80	4.85	— 0.3	19	6,717	e.	33	e.	5	9	16	5	4.8	
Santiago de Cuba	82	46	52	29.85	29.93	+ .03	80.6	.....	93	24	90	69	20	72	23	74	73	82	7.36	.....	13	3,630	n.	24	se.	12	2	24	4	6.0	
Santo Domingo	57	37	44	29.91	29.96	+ .05	78.9	.....	90	24	86	69	19	71	18	75	73	86	6.04	.....	17	3,872	n.	24	se.	21	2	22	6	5.9	
Willemstad	.....	.....	.....	29.80	29.88	+ .03	82.2	.....	89	2	87	71	23	77	16	76	74	78	1.18	.....	4	9,037	e.	30	ne.	23	10	16	4	4.7	

NOTE.—The data at stations having no departures are not used in computing the district averages. * More than one date.

TABLE II.—*Climatological record of voluntary and other cooperating observers, September, 1902.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Ashville	89	42	70.8	6.01	
Benton				3.58	
Bermuda	93[c]	43[c]	75.8[c]	5.00	
Birmingham	91	45	74.6	3.76	
Bridgeport				3.44	
Burkeville				4.25	
Calera				2.60	
Camphill	92	42	72.4	2.20	
Citronelle	91	48	75.9	6.23	
Clanton	88	47	72.4	3.08	
Cordova	93	35	72.2	2.37	
Daphne	97[c]	54[c]	77.1[c]	8.67	
Decatur	92	45	73.1	2.46	
Demopolis				3.31	
Eufaula *a*	94	47	75.2	5.22	
Eutaw	94	46	74.2	3.56	
Evergreen	92	49	76.2	7.85	
Flomaton	90	48	75.6	5.15	
Florence *a*				6.10	
Florence *b*	92	37	71.0	5.28	
Fort Deposit	92	46	75.2	1.39	
Gadsden	94	43	72.2	4.60	
Goodwater	93	46	73.0	2.93	
Greensboro	91	46	74.1	3.84	
Greenville				3.25	
Hamilton	92			3.97	
Helena				0.40	
Highland Home	91	48	75.1	3.12	
Letohatchie				0.08	
Livingston *a*		45		4.17	
Lock No. 4	92	44	71.6	3.83	
Madison Station	94	40	72.0	3.32	
Maplegrove	95	39	70.4	5.73	
Marion	90	41	74.0	3.59	
Milstead				7.80	
Newbern	94	41	76.0	3.99	
Notasulga				6.58	
Oneonto	88	41	71.2	2.53	
Opelika	92	46	73.0	5.37	
Ozark	95	55	77.0	4.78	
Prattville	95	44	74.5	5.77	
Pushmataha	88	43	72.9	4.53	
Riverton	91	36	69.6	12.41	
Scottsboro	93	40	68.9	2.72	
Selma	93	47	74.9	4.11	
Talladega	93[d]	42	73.6	5.50	
Tallassee				5.51	
Thomasville	92	45	75.3	4.62	
Tuscaloosa	94	43	74.2	4.67	
Tuscumbia	91	41	70.6	5.30	
Tuskegee	97	47	76.8	3.54	
Union Springs	94	46	76.0	2.06	
Uniontown	91	42	75.1	1.74	
Valleyhead	90	43	71.8	2.54	
Verbena				1.83	
Wetumpka				2.59	
Alaska.					
Copper Center	68	21	45.4	0.73	2.0
Fort Egbert	63	22	41.9	0.65	3.2
Juneau	59	37	49.2	14.24	
Killisnoo	60	38	49.2	7.20	
Sitka	62	40	50.3	13.43	
Skagway	62	35	49.8	1.66	
Arizona.					
Agua Caliente	109	54	84.8		
Allaire Ranch				0.32	
Arizona Canal Co's Dam	111	60	83.3	1.84	
Ashfork	97	25	63.0	T.	
Benson *1	98	65	77.5	0.04	
Bisbee	90	55	71.1	1.64	
Buckeye	105	47	78.6	0.40	
Casagrande *1	98	68	82.1	T.	
Cochise *1	82	60	71.6	0.00	
Congress	102	58	79.4	1.71	
Dragoon Summit *1	91	60	73.0	0.33	
Dudleyville	101	47	77.3	2.91	
Duncan	95	38	70.1	0.46	
Fort Apache	95	37	65.9	2.26	
Fort Defiance	85	29	57.1	1.00	
Fort Grant	94	47	70.0	1.25	
Fort Huachuca	90	50	74.8	1.21	
Gilabend *1	110	64	86.2	0.00	
Globe	101	50	75.0	2.00	
Jerome	98	47	74.3	0.20	
Maricopa *1	110	60	83.7	1.04	
Mesa	109	50	81.6	2.20	
Mesa (near)	107	49	81.2	0.71	
Mohawk Summit *1	115	74	90.5	0.00	
Mount Huachuca	91	50	71.7	1.25	
Natural Bridge				2.87	
Nogales	95	50	73.4	1.15	
Oro				2.00	
Phoenix	108	50	82.5	1.28	
Pima	102	40	76.1	0.10	
Pinal Ranch				2.01	
Prescott	91	28	63.0	1.59	
St. Johns	93	31	64.8	1.23	
Sentinel *1	108	72	87.6	0.50	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Showlow				2.06	
Signal	115	44	82.0	0.79	
Superstition				2.59	
Taylor	94	30	62.9	1.00	
Tombstone	92	52	73.0	1.50	
Tonto	101	49	76.2	2.83	
Tuba	98	37	68.8	0.08	
Tucson	105	53	79.8	0.58	
Vail *3	95	65	79.5	0.12	
Walnut Grove				1.26	
Willcox *1	90	58	72.6	0.78	
Yarnell				3.15	
Arkansas.					
Alco	89	36	67.5	5.29	
Amity	93	40	69.1	6.21	
Arkansas City				4.18	
Batesville	95	38	70.2	4.79	
Beebranch	90[c]	39[c]	67.8[c]	3.85	
Blanchard Springs	93	39	71.4	6.21	
Brinkley	91	39	68.7	3.83	
Camden *a*				3.80	
Camden *b*	94	44	71.2	3.72	
Conway	95			4.30	
Corning	88	37	65.0	2.79	
Dallas	96	41	68.2	6.24	
Dardanelle				2.63	
De Queen	103	40	70.6	7.23	
Dutton	84	34	63.4	2.82	
Elon	96[b]			5.83	
Eureka Springs	94	35	67.0	2.98	
Fayetteville	88	33	64.4	4.29	
Forrest City	92	40	69.2	3.58	
Fulton				5.10	
Hardy [e]	86	37	64.0		
Helena *a*				4.64	
Helena *b*	92	45	70.2	4.37	
Jonesboro	91[c]	45[c]	69.6[c]	5.39	
Lacrosse	90	35	66.2	5.09	
Lake Village	92	40	70.8	5.65	
Lonoke	89	37	68.3	3.80	
Lutherville	90	35	67.4	3.42	
Malvern	99	39	70.2	8.40	
Marianna	93	39	69.5	5.32	
Marvell	93	40	70.8	6.04	
Mossville	82	36	62.3	6.71	
Mountain Home	92	36	66.4	3.94	
Mount Nebo	84	45	66.0	3.83	
New Gascony	96	39	70.9	7.46	
Newport *a*				4.75	
Newport *b*	92	38	67.6	5.35	
Newport *c*	90	37	66.6	4.77	
Oregon	98	32	69.8	3.12	
Ozark	94	41	70.2	3.35	
Perry	89	37	67.5	3.79	
Pinebluff	96	40	70.2	9.31	
Pocahontas	89	36	66.0	5.49	
Pond	88[c]	30[c]	64.0[c]	5.93	
Prescott	95	47	72.1	5.62	
Princeton	97	38	70.3	6.78	
Rison	97	37	70.8	5.83	
Rosadale	98	42	71.6	7.41	
Russellville	91	41	68.0	3.16	
Silversprings	88	33	65.2	3.44	
Spielerville	93	38	69.0	3.97	
Stuttgart	92	39	69.2	6.80	
Texarkana	96	44	72.4	4.14	
Warren	96	40	70.5	6.70	
Washington	90	44	70.8	7.04	
Wiggs	90	36	67.0	6.44	
Winchester				6.75	
Winslow	84	38	63.4	6.04	
Witts Springs	87	39	63.2	5.93	
California.					
Angiola	107	40	74.8	0.00	
Azusa	96	50	72.8	0.07	
Bakersfield	107	44	75.4	0.00	
Ballast Point L. H				0.00	
Berkeley	83	49	63.6	0.00	
Bishop	98	31	67.4	0.05	
Boca *1	90	18	56.6	0.00	
Bodie	84	6	48.4	0.00	
Bowman	96	40	64.6	0.02	
Branscomb				T.	
Caliente *1	106	70	83.6	0.00	
Campbell	97	37	65.2	0.00	
Campo				0.00	
Cape Mendocino L. H				0.00	
Cedarville	95	26	61.4	0.46	
Chico	105[c]	40[c]	72.4[c]	0.00	
Cisco *1	75	35	55.8	T.	
Claremont	95	44	68.4		
Cloverdale	103	41	68.8	0.00	
Colusa	102	44	71.9	0.00	
Corning *1	106	60	75.4	0.00	
Coronado	78	56	68.4	0.00	
Crescent City	77	39	55.4	0.76	
Crescent City L. H				0.00	
Cuyamaca	81	34	59.2	T.	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Delano *1	104	61	81.6	0.00	
Delta *1	105	45	71.4	0.00	
Drytown	100	44	70.5	0.00	
Dunnigan *1	106	51	75.1	0.00	
Durham *3	104	48	72.6	0.00	
East Brother L. H				0.00	
Edmanton *1	94	34	61.8	0.14	
Elcajon	96	45	70.6	0.00	
Elmdale	105	41	72.5	0.00	
Elsinore	112	46	75.7	0.00	
Escondido	97	41	68.8	0.00	
Fallbrook	92	45	69.4	0.00	
Folsom *1	104	52	72.2	T.	
Fordyce Dam				0.31	
Fort Bragg				0.00	
Fort Ross	86	46	61.2	0.00	
Foster				0.00	
Georgetown	101	40	72.7	0.00	
Geyserville	80	58	67.6	0.00	
Gilroy (near)	106	37	66.4	0.00	
Goshen *3	104	54	81.6	0.00	
Grass Valley				T.	
Greenville	98	25	61.0	0.04	
Hanford	109	32	70.2	0.00	
Healdsburg	99	38	66.6	0.00	
Hollister	105	39	66.0	T.	
Humboldt L. H				0.00	
Idylwild	88	38	62.2	T.	
Imperial	112	54	85.7	T.	
Indio *1	116	66	89.5	0.00	
Iowa Hill *1	95	50	70.8	0.00	
Irvine	90	60	71.9	0.00	
Jackson	94	49	72.4	0.00	
Jolon				0.00	
Kennedy Gold Mine	95	44	68.8	0.00	
Kent				0.00	
Kernville				0.00	
King City	107	36	67.9	0.00	
Kingsburg	101	50	72.6	0.00	
Kono Tayee	96	50	73.0	0.00	
Laguna Valley				0.00	
Laporte *1	87	38	57.3	0.18	
Legrande	106	44	74.2	0.00	
Lemoncove	107	46	77.8	0.00	
Lick Observatory	89	40	68.2	0.00	
Lime Point L. H				0.00	
Livermore	106	44[c]	69.8	0.00	
Lodi	101	41	69.0	0.00	
Los Gatos	100	42	66.9	T.	
Mammoth *3	111	68	88.0	0.00	
Manzana	106	45	79.7	0.00	
Mare Island L. H				0.00	
Merced	105	42	74.5	0.00	
Mercury	96	46	68.8	0.00	
Mills College				0.00	
Milo				0.00	
Milton (near)	100	48	73.8	0.00	
Modesto *1	106	50	76.4	0.00	
Mohave *1	100	55	77.3	0.00	
Mokelumne Hill	86	47	68.8	0.00	
Monterio	94	44	71.8	0.00	
Monterey *1	81	45	64.7	0.00	
Mount St. Helena				0.00	
Napa	100	45	68.7	0.00	
Needles	110	58	87.2	0.60	
Nevada	96	35	65.5	0.00	
Newhall *1	108	55	73.0	0.00	
Newman	103	46	73.4	0.00	
Niles	94	42	66.4	0.00	
North Bloomfield	103	37	69.5	T.	
North Ontario	100	47	71.8	0.00	
North San Juan *1	104	55	73.8	0.03	
Oakland	82	51	64.0	0.00	
Ogilby *1	112	78	92.1	0.00	
Orland *1	99	58	76.2	0.00	
Palermo	107	42	72.1	0.00	
Paso Robles	110	32	66.4	0.00	
Peachland *3	87	46	65.0	0.03	
Piedras Blancas L. H				0.00	
Pigeon Point L. H				0.00	
Pilot Creek				0.00	
Pine Crest	92	52	67.6	0.00	
Placerville	96	37	66.0	0.04	
Point Ano Nuevo L. H				0.00	
Point Arena L. H				0.03	
Point Bonita L. H				0.00	
Point Conception L. H				0.00	
Point Fermin L. H				0.00	
Point George L. H				0.10	
Point Hueneme L. H				0.00	
Point Lobos	80	53	60.0	0.00	
Point Loma L. H				0.00	
Point Montara L. H				0.00	
Point Pinos L. H				0.00	
Point Sur L. H				0.00	
Pomona (near)	102	48	72.8	0.00	
Porterville	108	42	75.8	0.00	
Poway	92	47	70.8	0.00	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Quincy	90	25	58.4	0.02	
Redding	106	49	76.4	0.00	
Redlands	108	48	74.6	0.00	
Reedley	106	42	73.0	0.00	
Represa	100	48	70.4	0.00	
Riovista	102	47	70.2	0.00	
Riverside	102	43	71.0	T.	
Roe Island L. H				0.00	
Rohnerville [85]				0.09	
Rosewood	107	40	72.5	0.00	
Sacramento	96	49	68.4	0.00	
Salinas	92	40	65.2	0.00	
Salton [81]	117	64	93.5	0.00	
San Bernardino	108	39	72.8	0.00	
San Jacinto	110	44	74.4	0.00	
San Jose	98	44	67.6	0.00	
San Leandro	90	44	64.2	0.00	
San Luis L. H				0.00	
San Mateo [81]	86	54	66.9	0.00	
San Miguel [81]	102	48	69.9	0.00	
Santa Barbara	90	51	66.0	0.00	
Santa Barbara L. H				0.00	
Santa Clara				0.00	
Santa Cruz	93	39	62.2	0.00	
Santa Cruz L. H				0.00	
Santa Maria	94	44	65.3	0.00	
Santa Monica	76	50	63.7	0.00	
Santa Paula	95	50	70.6	0.00	
Santa Rosa	95	38	65.8	0.00	
Shasta	110	45	77.7	0.00	
Sierra Madre	91	50	70.2	0.00	
Sonoma				0.00	
S. E. Farallone L. H				0.00	
Stockton	97	47	68.7	0.00	
Storey	105	42	73.4	0.00	
Summerdale	93	38	65.6	0.00	
Susanville	90	30	61.6	0.12	
Tehama [81]	108	57	78.7	0.00	
Tejon Ranch	101	52	76.8	T.	
Trinidad L. H				0.45	
Truckee [81]	78	36	49.9	0.00	
Tulare	106	44	74.2	0.00	
Tustin	84	60	72.8	T.	
Ukiah	108	32	67.1	0.00	
Upperlake	106	36	70.0	0.00	
Upper Mattole [81]	93	35	59.2	0.03	
Vacaville [81]	104	50	72.7	0.00	
Ventura	89	49	65.7	0.00	
Visalia	105	42	73.8	0.00	
Volcano [81]	118	66	92.0	T.	
Wasco	106	45	76.8	0.00	
Wheatland	100	46	70.4	0.00	
Williams [81]	104	51	77.0	0.00	
Willits	104	34	68.6	0.00	
Willows	107	46	73.8	0.00	
Yerba Buena L. H				0.00	
Yreka	95	33	63.6	0.00	
Yuba City [85]	102	50	73.6	0.00	
Zenia				0.12	
Colorado.					
Alford	89	28	56.9	4.59	
Arkins	92	29	61.2	4.13	
Ashcroft	79	21	47.4	2.46	
Blaine	105	30	65.6	T.	
Boulder	92	33	60.8	5.46	
Boxelder				4.37	T.
Breckenridge	74	12	44.8	2.26	T.
Buenavista				0.06	
Canyon	93	32	62.4	0.95	
Castlerock	92	26	58.5	3.17	
Cedaredge	88	29	60.5	1.00	
Cheesman				2.07	
Cheyenne Wells	91	29	59.1	0.20	
Clearview	75	23	51.0	1.13	T.
Collbran	96	26	60.2	1.08	
Colorado Springs	89	27	57.4	1.60	
Delta	96	25	62.2	0.37	
Durango	89	32	59.9	2.02	
Fort Collins	90	22	56.8	7.12	
Fort Morgan				3.91	
Fox	95	26	60.0	2.29	
Garnett	83	19	53.0	0.37	
Gilman				1.60	6.0
Gleneyre	91	24	56.6	2.50	
Greeley	95	24	60.4	4.13	
Grover				2.90	
Gunnison	84	18	52.0	0.47	
Hamps	89	24	56.2	1.37	
Hoehne	95	40	66.6	0.63	
Holyoke (near)	98	22	58.4	4.25	
Husted	92	20	55.1	2.04	
Lake Moraine	72	18	46.5	2.75	9.5
Lamar	102	30	66.6	0.00	
Laporte				5.76	
Las Animas	96	25	64.2	0.52	
Lay	88	18	53.2	1.28	T.
Leadville (near)				0.47	3.3
Leroy	93	29	59.4	3.46	T.
Colorado—Cont'd.					
Longs Peak	74	13	47.1	4.42	21.0
Mancos	85	28	57.0	1.31	
Marshall Pass				1.26	17.0
Meeker	86	23	55.1	1.43	
Mitchell				1.00	8.5
Montrose				0.40	
Moraine	79	15	52.6	3.70	
Pagoda	89	22	54.6	1.52	2.5
Parachute	94	29	60.6	0.90	
Rangely	89	28	57.2	1.59	
Rockyford	95	30	62.0	0.46	
Rogers Mesa	92	30	61.8	1.14	
Ruby				0.97	
Russell	80	19	50.1	0.99	T.
Saguache	82	30	54.8	0.64	
Salida	92	24	57.7	1.34	
San Luis	84	23	54.9	0.94	
Santa Clara	87	28	55.9	1.17	1.0
Seibert				1.51	
Silt	90	30	61.6	1.09	
Sugarloaf	88	23	53.6	3.36	1.0
Telluride	79	25	51.4	1.97	8.0
Trinidad	88	32	60.8	0.62	
Twinlakes				1.20	
Vilas				0.60	
Wagon Wheel	80	19	48.4	1.30	
Wallet				1.70	T.
Westcliffe	81	18	52.4	1.55	
Whitepine	70	20	46.6	0.90	T.
Wray	96	28	61.4	3.73	
Yuma				1.68	
Connecticut.					
Bridgeport	87	43	63.8	5.58	
Canton	85	32	58.8	7.15	
Colchester	83	38	62.1	6.98	
Falls Village				8.44	
Hartford	85	43	62.2	7.33	
Hawleyville	86	37	61.4	6.25	
Lake Konomoc				7.82	
New London	86	45	63.1	4.63	
North Grosvenor Dale	86	36	61.2	3.94	
Norwalk	86	38	62.0	7.87	
Southington	85	38	61.4	7.70	
South Manchester				4.72	
Storrs	84	34	61.4	7.05	
Voluntown	86	34	62.2	5.36	
Wallingford				7.53	
Waterbury	89	37	62.6	6.42	
West Cornwall	83	38	60.2	7.83	
West Simsbury				5.78	
Delaware.					
Milford	92	43	68.6	6.42	
Millsboro	91	42	67.4	6.20	
Newark	88	43	65.0	6.04	
Seaford	89	45	68.6	5.91	
District of Columbia.					
Distributing Reservoir [85]	89	50	68.4	5.79	
Receiving Reservoir [85]	89	49	67.4	5.96	
West Washington	92	40	66.8	6.71	
Florida.					
Archer	92	65	78.2	10.43	
Avon Park	94	70	81.2	9.03	
Bartow	97	72	81.9	10.79	
Bonifay	98	60	78.4	6.19	
Brooksville	94	68	80.0	8.16	
Carrabelle	90	62	78.7	17.26	
Clermont	96	68	81.4	8.79	
De Funiak Springs	93	58	76.6	9.33	
Deland	90	68	78.3		
Eustis	97	69	81.3	8.18	
Federal Point	93	68	79.2	9.31	
Fernandina	91	66	77.6	20.25	
Flamingo	93	71	82.8	3.55	
Fort George	89	70	78.4		
Fort Meade	98	67	81.0	10.47	
Fort Myers	89	70	79.2	6.60	
Fort Pierce	93	68	79.2	9.47	
Gainesville	93	68	79.2	10.42	
Holt [b]	93	55	75.8	2.70	
Huntington	96	68	80.2	9.28	
Hypoluxo	90	69	80.0	7.98	
Inverness	93	69	79.0	13.82	
Johnstown	96	63	77.9	11.63	
Kissimmee	95	68	81.4	6.35	
Lake City	95	65	78.6	7.18	
Macclenny	98	61	78.6	6.92	
Malabar	93	70	78.6	8.48	
Manatee	92	69	80.2	7.40	
Marco	96	66	81.8	4.10	
Marianna	92	58	76.5	12.80	
Merritt Island	92	72	81.0	10.68	
Miami	92	69	82.3	7.81	
Molino	90	53	77.6	6.16	
New Smyrna	94	66	79.1	10.47	
Nocatee	96	70	81.6	6.32	
Ocala	96	68	79.9	7.16	
Orlando	92	70	80.2	13.66	
Pinemount	94	65	79.0	8.76	
Florida—Cont'd.					
Plant City	95	68	79.7	10.59	
Rideout	97	65	78.6	10.01	
Rockwell	100	63	80.0	11.95	
St. Andrews	91	62	78.8	14.39	
St. Augustine	90	71	79.2	9.98	
St. Leo	94	68	80.0	11.48	
Stephensville	93			9.90	
Sumner	92	66	78.6	9.00	
Switzerland	95	66	78.2	14.73	
Tallahassee	89	62	76.3	7.55	
Tarpon Springs	91	69	79.9	4.97	
Titusville	94	68	79.9	7.31	
Waukeenah	94	62	77.1	14.88	
Wausau	98	55	78.0	10.45	
Wewahitchka	94	61	78.2	12.26	
Georgia.					
Adairsville	87	46	70.2	3.90	
Albany	96	56	78.2	3.81	
Allapaha	92	57	75.5	4.19	
Alpharetta	89	42	69.0	3.92	
Americus	92	54	74.3	2.65	
Athens	88	51	70.4	4.82	
Bainbridge	92	58	76.0	8.19	
Blakely	90	56	74.0	3.17	
Bowersville	96	44	69.9	3.33	
Brent	94	48	72.1	3.99	
Butler				1.38	
Camak	94	49	72.2	1.55	
Canton				2.66	
Carlton				5.48	
Clayton	86	40	65.0	9.69	
Columbus	95	53	76.0	3.96	
Covington	93	48	72.1	3.51	
Dahlonega	85	44	67.4	6.82	
Diamond	84	41	65.2	7.18	
Douglas	96	53	75.6	5.26	
Dublin				1.71	
Dudley	93	54	74.5	2.84	
Eastman	92	56	75.5	4.03	
Elberton	93	49	71.6	4.45	
Experiment	90	49	71.2	2.59	
Fitzgerald	96	55	76.1	5.96	
Fleming	95	55	74.9	5.45	
Fort Gaines	93	57	76.6	6.64	
Gainesville	92	48	69.2	7.05	
Gillsville	91	47	70.6	7.17	
Greensboro	93	48	71.4	3.71	
Griffin	96	49	73.0	3.19	
Harrison	91	52	73.6	2.84	
Hawkinsville	94	52	73.0	3.82	
Hephzibah	97	53	76.6	0.55	
Lost Mountain	87	42	70.4	5.30	
Louisville	90	54	73.8	1.96	
Lumpkin	95	46	75.0	5.29	
Marshallville	92	56	76.3	2.05	
Mauzy	97	59	77.0	4.98	
Milledgeville	95	50	71.8	3.49	
Monticello	96	50	73.7	1.79	
Morgan	92	56	74.5	5.37	
Naylor	90	61	78.4	5.78	
Newnan	89	46	70.7	4.40	
Oakdale				3.45	
Pelham				6.18	
Point Peter	94	47	70.0	5.83	
Poulan	95	55	76.0	2.64	
Putnam	97	49	75.6	2.98	
Quitman	92	61	76.7	7.97	
Ramsey	86	41	69.8	3.70	
Resaca				5.90	
Rome	91	42	70.7	3.95	
St. Marys	95	65	77.4	18.26	
Statesboro	94	55	76.1	2.34	
Stillmore	94	54	74.9	3.64	
Talbotton	94	47	73.4	3.10	
Tallapoosa	94	41	70.8	5.05	
Thomasville	96	60	77.6	9.52	
Toccoa	89	45	68.9	10.41	
Valona	91	61	76.0	8.47	
Vidalia	95	55	76.0	3.71	
Washington	90	53	71.0		
Waverly	95	63	77.4	10.00	
Waycross	91	62	76.2	8.92	
Waynesboro	88	52	72.7	2.10	
Westpoint	92	54	73.9	3.09	
Woodbury	92	42	71.6	2.82	
Idaho.					
Albion	90	22	55.8	0.17	
American Falls	94	26	59.0	0.38	2.4
Blue Lakes	96	32	62.8	T.	
Burnside	86	16	54.1	0.05	T.
Cambridge				0.20	
Chesterfield	88	9	50.6	T.	T.
Downey	90	17	55.0	0.01	
Forney	92	15	50.8	0.69	1.0
Garnet	98	31	64.8	T.	
Grangeville	68	27	47.9	0.00	
Hailey	95	22	57.6	0.09	
Lakeview	84	29	54.4	1.71	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Idaho—Cont'd.					
Lost River	89	22	55.8	0.09	T.
Moscow	95	30	58.7	1.29	
Murray	83	26	50.8	2.22	
Oakley	97	27	60.0	0.30	
Ola	96	28	59.4	0.33	
Payette	99	30	60.7	0.35	
Pollock	93	32	61.6	0.38	
Porthill	80	30	52.8	1.46	
Priest River	82	27	52.0	1.24	
Riddle				0.40	
St. Maries	86	28	55.6	1.30	
Silver City	90	25	56.8	0.42	T.
Soldier	92	16	52.8	0.04	T.
Swan Valley	85[3]	19	55.6	0.31	
Weston	94	22	58.8	0.10	
Illinois.					
Albion	87	35	66.4	3.03	
Aledo	81	35	61.0	5.11	
Alexander	84	34	62.2	4.01	
Antioch	85	36	59.4	7.35	
Ashton	80	33	58.6	4.09	
Astoria	80	34	60.8	3.03	
Aurora	82	33	59.6	7.29	
Benton	94	35	67.8	1.80	
Bloomington	88	34	63.1	4.91	
Cambridge	82	37	60.6	5.99	
Carlinville	87	35	63.6	3.76	
Carrollton	86	38	63.4	4.66	
Centralia	89	33	65.8	2.70	
Charleston	86	33	64.9	4.98	
Chemung	81	30	59.3	5.44	
Chester				3.48	
Cisne	91	33	67.1	1.55	
Coatsburg	83	33	61.4	2.01	
Cobden	91	37	67.1	3.42	
Decatur	84	35	62.9	4.98	
Dixon	81	37	60.5	4.63	
Dwight	84	34	61.1	5.36	
Effingham	87	35	64.6	3.44	
Equality	92	34	65.8	3.74	
Fandon	83	32	61.4	3.06	
Flora	94	30	65.4	3.37	
Friendgrove[23]	90	38	66.6	2.76	
Galva	85	36	60.6	6.04	
Grafton				3.74	
Greenville	91	35	65.8	2.43	
Griggsville	86	36	63.4	3.36	
Halfway	90	35	67.2	2.54	
Halliday	89	32	65.4	1.88	
Henry	87	35	61.7	6.10	
Hillsboro	87	37	64.2	5.32	
Hoopeston	84	34	62.1	3.01	
Joliet	83	36	60.4	6.28	
Kishwaukee				7.04	
Knoxville	84	34	60.0	4.04	
Lagrange	81	39	59.8	5.91	
Laharpe	85	31	61.0	2.50	
Lanark	80	29	58.0	5.63	
Loami				4.02	
McLeansboro	90	37	67.2	2.44	
Martinsville	90	32	64.0	3.78	
Martinton	88	33	61.7	6.84	
Mascoutah	83	34	63.1	2.52	
Mattoon	82	36	62.4	1.97	
Minonk	85	35	60.7	4.89	
Monmouth	84	31	59.8	3.48	
Morrison	81	35	59.9	3.99	
Morrisonville	88	34	64.0	2.89	
Mount Carmel				3.17	
Mount Pulaski	86	35	63.2	4.13	
Mount Vernon	92	32	66.0	3.26	
New Burnside	90	35	68.2	5.07	
Olney	90	35	66.5	2.14	
Ottawa	85	38	63.1	6.76	
Palestine	88	35	64.4	3.14	
Pana	85	34	63.5	4.01	
Paris	89	36	64.8	3.31	
Peoria *a*				5.64	
Peoria *b*	84	37	63.8	6.84	
Philo	84	31	62.0	4.06	
Plumhill	88	35	65.0	3.70	
Rantoul	87	34	63.5	4.73	
Raum	91	36	67.6	2.83	
Riley	81	35	59.4	3.58	
Robinson	88	33	64.5	2.72	
Rockford	83	36	60.0	6.43	
Rushville	85	33	62.7	4.32	
St. Charles	81	40	60.8	6.65	
St. John	91	34	66.3	2.44	
Shobonier	91	32	64.4	2.82	
Strawn	87	31	63.8	5.67	
Streator	84	36	61.6	5.26	
Sullivan	86	34	63.8	3.13	
Sycamore	85	35	60.4	4.29	
Tilden	88	32	64.5	3.79	
Tiskilwa	79	38	59.8	6.25	
Tuscola	86	34	63.2	2.85	
Urbana	84	34	62.2	4.90	
Walnut	84	36	61.8	4.99	
Wellington	84	35	63.0	3.53	
Winchester	84	34	62.2	4.06	
Winnebago	84	33	59.2	4.71	
Yorkville	84	37	61.0	8.23	
Zion	81	35	59.8	4.04	
Indiana.					
Anderson	86	33	64.4	5.73	
Angola	82	36	60.0	4.81	
Auburn	84[e]	31[d]	59.4[d]		
Bloomington	84	36	64.3	4.06	
Bluffton	86	31	62.2	6.79	
Butlerville	87	35	65.6	4.21	
Cambridge City	88	30	62.0	4.92	
Columbus	88	32	63.9	4.13	
Connersville	88	33	62.8	5.11	
Crawfordsville	90	35	66.1	4.97	
Delphi	87	32	62.4	4.01	
Edwardsville	86	42	67.9	3.68	
Farmland	84	35	62.7	5.61	
Fort Wayne	88	31	62.4	9.87	
Franklin	86	40	63.6	5.50	
Greencastle	84	37	63.2	6.44	
Greensburg	86	33	63.6	7.65	
Hammond	82	39	60.4	3.16	
Hector	86[g]	32[g]	61.2[g]	4.35	
Holland	92	35	67.0	3.21	
Huntington	85	33	61.8	7.33	
Jeffersonville	89	39	67.0	4.25	
Knightstown	86[g]	43[g]	66.6[g]	5.84	
Kokomo	85	35	63.0	6.03	
Lafayette	87	35	63.3	3.72	
Laporte	83	34	61.2	5.26	
Logansport	88	36	63.2	4.40	
Madison *a*	92	39	67.2	3.28	
Madison *b*				3.01	
Marengo	88	34	65.0	5.82	
Marion	87	32	63.4	6.10	
Markle	86	32	62.3	6.70	
Mauzy	89	32	64.2	5.61	
Moores Hill	88	36	65.7	5.00	
Mount Vernon	91	36	66.8	2.46	
Northfield	87	30	61.8	5.16	
Oolitic	92	33	65.1	3.89	
Paoli	91	34	65.8	4.28	
Prairie Creek	90	36	64.8	2.92	
Princeton	89	33	65.8	3.53	
Rensselaer	81	34	61.9	4.20	
Richmond	88	32	64.6	3.87	
Rockville	86	35	63.2	4.73	
Salem	92	31	66.4	4.32	
Scottsburg	89	36	65.2	3.77	
Seymour	87	35	64.3	4.25	
Shelbyville				5.32	
South Bend	84	40	62.2	4.50	
Syracuse	86	35	61.7	6.30	
Terre Haute	88	44	66.5	3.78	
Topeka	81	37	60.0	4.39	
Valparaiso	83	35	61.0	5.17	
Veedersburg	87[e]	31[e]	64.2[e]	4.38	
Vevay	90	40	67.0	3.85	
Vincennes	92	34	66.2	2.80	
Washington	95	33	65.9	3.07	
Winamac	85	28	60.4	3.65	
Worthington	99	32	64.8	3.26	
Indian Territory.					
Ardmore	98	43	70.8	9.97	
Chickasha	97	37	68.8	6.00	
Claremore	94	35	67.2	3.80	
Durant	100	41	70.2	6.98	
Fairland	87	35	66.0	4.43	
Goodwater	104	41	71.9	6.77	
Hartshorne	96	36	71.4	4.40	
Healdton	100	35	71.2	7.55	
Holdenville				13.64	
Marlow	99	42	68.6	7.45	
Muskogee	91	40	67.8	8.83	
Pauls Valley	91	35	68.2	6.42	
South McAlester				5.31	
Tahlequah	91	35	67.4	7.62	
Tulsa				5.97	
Wagoner	100	36	68.7	9.10	
Webbers Falls				7.24	
Iowa.					
Afton	82	32	59.2	7.32	
Albia	85	35	61.0	6.42	
Algona	83	34	59.0	4.95	
Allerton	84	34	60.6	6.24	
Alta	81	29	56.7	3.94	
Amana	81	34	59.7	6.36	
Ames	83	31	59.8	1.66	
Atlantic	85	25	58.9	4.44	
Audubon	84	30	59.8	4.98	
Baxter	82	32	59.2	4.85	
Bedford	83	28	59.4	4.76	
Belknap	80	35	59.2	5.17	
Bonaparte	84	33	61.2	3.51	
Britt	81	27	57.4	3.41	
Buckingham				4.13	
Burlington	85	34	62.6	2.77	
Carroll	85	29	59.6	5.39	
Cedar Rapids	83	38	61.0	4.83	
Centerville	83	34	58.7	4.98	
Charlton	84	33	59.6	9.10	
Charles City	81	29	58.8	2.80	
Chester	80	26	57.2	2.56	
Clarinda	87	31	59.9	4.72	
Clearlake	85	33	58.6	1.65	
Clinton	83	31	59.6	3.79	
College Springs	83	34	58.8	3.50	
Columbus Junction	85	33	60.7	4.00	
Corning	81	32	58.5	5.01	
Corydon	83	33	60.4	7.57	
Council Bluffs	88	33	60.8	2.21	
Cresco	78	31	56.3	2.93	
Cumberland				5.46	
Danville				2.90	
Decorah	79	31	58.2	3.86	
Delaware	78	32	57.6	3.56	
Denison	88	29	59.6	4.02	
De Soto	81	34	60.2	5.76	
Dows	80	30	57.8	2.66	
Earlham	84	29	58.1	5.80	
Eldon	86	31	60.6	5.25	
Elkader	86	30	59.8	4.12	
Emerson				2.90	
Estherville	82	30	55.4	2.65	
Fairfield	84	32	60.9	4.13	
Fayette	82	26	57.0	3.86	
Forest City	82	30	58.2	3.95	
Fort Dodge	84	27	58.4		
Fort Madison				2.29	
Galva	82	23	58.0	3.68	
Gilman				3.85	
Grand Meadow	78	33	57.6	4.61	
Greene	82	32	58.2	4.00	
Greenfield	80	33	58.8	6.30	
Grinnell (near)	80	34	59.0	4.57	
Grundy Center	82	32	58.0	4.67	
Guthrie Center	83	31	58.4	5.49	
Hampton	84	34	59.2	4.67	
Harlan	83	27	58.4	5.63	
Hopeville				8.60	
Humboldt	82	31	58.8	3.15	
Independence	81	29	58.0	3.27	
Indianola	82[e]				
Iowa City	85	33	61.0	5.87	
Iowa Falls	80	30	56.9	3.46	
Jefferson				5.32	
Keosauqua	85	32	61.7	4.16	
Knoxville	83	33	60.0	6.68	
Lacona				5.86	
Lansing	83	28	60.1	3.00	
Larrabee	83	29	57.7	3.45	
Leclaire				3.67	
Lemars	83	26	58.2	4.67	
Lenox	81	34	59.4	4.26	
Leon	81	35	60.2	9.08	
Logan	82	28	59.3	3.40	
Maple Valley				3.71	
Maquoketa	83	30	59.6	6.39	
Marshalltown	85	32	59.6	5.70	
Monticello	82	31	57.8	4.82	
Mountayr	82	32	59.8	7.29	
Mount Pleasant	82	32	60.5	4.88	
Mount Vernon	82	34	59.8	5.80	
New Hampton	78	32	55.8	6.75	
Newton	80	35	58.7	4.95	
Northwood	78	35	57.3	2.55	
Odebolt	85	30	59.4	3.41	
Ogden	84	30	60.7	3.25	
Olin	78	31	58.2	6.35	
Onawa	87	33	61.4	4.75	
Osage	80	34	57.0	2.10	
Osceola	83	35[e]	59.8	7.89	
Oskaloosa	82	31	59.8	5.12	
Ottumwa	79	38	59.8	10.41	
Pacific Junction	84	31	60.6	2.17	
Perry				3.60	
Plover	83	25	55.6	4.19	
Redoak	79	37	60.9	4.28	
Ridgeway	79	34	60.0	3.33	
Rockford				2.23	
Rockwell City				3.91	
Ruthven	83	31	58.0	2.70	
Sac City	83	32	59.1	3.09	
St. Charles	83	35	60.5	5.96	
Sheldon	85	28	57.8	3.31	
Sibley	88	28	57.6	3.98	
Sigourney	88	32	60.4	3.77	
Sioux Center	84	30	57.8	4.15	
Stockport				4.54	
Storm Lake	80	32	58.1	3.11	
Thurman	84	29	60.2	4.46	
Tipton	79	32	59.7	5.50	
Toledo	84	31	59.4	4.50	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Villisca	83	30	59.9	4.78	
Vinton *1	83	35	58.5	3.39	
Wapello	80	36	61.0	4.65	
Washington	83	30	58.7	3.13	
Washta				3.86	
Waterloo	83	33	59.4	4.86	
Waverly	81	31	58.6	4.27	
Westbend	82	32	57.8	2.99	
Westbranch				5.20	
West Union				4.89	
Whitten	81	31	57.8	3.49	
Wilton Junction	82	32	61.0	3.98	
Winterset	82	35	60.3	5.83	
Woodburn				7.10	
Kansas.					
Achilles	98	24	61.1	2.54	
Anthony				2.37	
Atchison *a*	85	35	62.8	3.67	
Baker	89	35	61.3	4.59	
Burlington	86			3.94	
Clay Center	89	32	63.4	2.96	
Colby	94	28	61.2	2.50	
Columbus	86	35	63.8	6.56	
Coolidge	96	28	64.4	0.41	
Cunningham	94	37	64.8	1.55	
Delphos	90	33	63.4	3.77	
Dresden	96	31	63.4	2.26	
Ellinwood	90	38	63.8	2.87	
Emporia	88	40	61.8	2.93	
Englewood	96	36	67.4	0.40	
Eureka				4.75	
Eureka Ranch				7.20	
Fallriver	87	34	64.2	5.00	
Farnsworth	97	31	64.1	4.88	
Forsha	91	36	63.8	1.69	
Fort Leavenworth	86	39	65.3	4.50	
Fort Scott	89	35	63.9	4.51	
Frankfort	88	29	62.8	3.85	
Fredonia	86[e]	39[g]	62.9[f]	4.43	
Garden City	98	31	66.2	1.00	
Grenola	88	34	63.9	5.41	
Hanover	87	32	62.1	3.45	
Harrison	91	29	62.2	6.23	
Hays	92	33	62.5	4.93	
Holton	84	34	61.0	6.33	
Horton	84	37	62.4	5.33	
Hoxie	94	32	61.8	3.98	
Hutchinson	92	34	63.7	1.75	
Independence	89	40	65.4	6.26	
Jetmore	95	33	65.0	0.93	
Lakin	99	33	65.6	0.33	
Lawrence	87	40	63.0	4.16	
Lebanon	90	29	61.6	6.70	
Lebo	85	39	63.2	5.79	
Leoti	100	30	64.8	1.32	
Little River	90	37	65.0	2.03	
Macksville	91	35	64.0	1.83	
McPherson	92	36	64.6	3.82	
Madison	86	38	62.2	4.16	
Manhattan *b*	89	31	64.8	3.45	
Marion	86	38	64.6	2.95	
Meade	101	37	69.4	0.75	
Medicine Lodge	95	35	66.6	3.47	
Minneapolis	90	34	63.9	3.22	
Moran	86	37	64.0	3.56	
Mounthope *1	88	40	64.6	2.05	
Ness City	97	35	66.4	3.47	
Newton	89[d]	37[d]	64.8[d]	3.70	
Norwich	91	39	66.1	1.57	
Oberlin				1.60	
Olathe	84	36	61.9	4.37	
Oswego	87	37	65.6	5.41	
Ottawa	88	30	62.4	5.77	
Paola	84	34	61.6	6.08	
Phillipsburg				7.02	
Pratt	92	35	63.7	1.84	
Republic	90	30	61.8	4.92	
Rome	92	36	65.8	4.11	
Salina	92	35	64.7	2.90	
Sedan	88	36	63.8	5.57	
Seneca	85	33	62.4	3.36	
Toronto	88	33	63.4	5.01	
Ulysses	100	32	66.5	0.40	
Valley Falls	83[d]	34	62.4	2.94	
Viroqua	102	30	65.3	0.25	
Wakeeney				8.57	
Wallace	92	29	63.5	1.80	
Wamego *1	83	35	61.8	4.88	
Winfield	87	37	64.3	4.95	
Yates Center	86	34	62.4	5.11	
Kentucky.					
Alpha	90	33	67.6	5.20	
Anchorage	86	33	65.4	3.62	
Bardstown	92	34	68.0	3.75	
Berea	92	31	67.6	3.98	
Blandville	87	39	65.8	4.61	
Bowling Green	96	35	68.2	4.35	
Burnside	95	42	69.2	3.86	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cadiz	96	34	69.2	2.51	
Carrollton	89	42	67.4	3.50	
Catlettsburg				2.31	
Centertown	94	33	68.1	5.32	
Earlington	92	34	66.7	3.62	
Edmonton	92	31	68.2	4.96	
Eubank	91	31	65.6	3.22	
Falmouth				3.24	
Fords Ferry	91	31	66.4	4.50	
Frankfort	87	36	66.0	4.74	
Franklin	91	38	69.2	4.35	
Greensburg	96	32	67.6	4.48	
Henderson	93	38	68.0	3.55	
High Bridge	91	37	68.2	2.52	
Hopkinsville	93	34	67.3	3.51	
Irvington	89	35	67.8	5.10	
Jackson	90	39	69.0	3.32	
Leitchfield	90	35	66.3	8.25	
Loretto	91	30	65.8	3.69	
Manchester	90	36	66.6	4.38	
Marrowbone	91	29	66.0	5.27	
Mayfield	91	38	68.0	2.64	
Maysville	93	36	67.0	4.78	
Middlesboro	86	34	65.0	1.83	
Mount Sterling	89	33	65.0	2.93	
Owensboro	89	38	66.5	5.59	
Owenton	85	41	66.2	3.30	
Paducah *a*				6.18	
Paducah *b*	94	42	69.2	6.48	
Pikeville	97	37	69.1	2.84	
Richmond	89	37	67.6	1.58	
St. John	89	35	66.4	8.26	
Scott	90	36	66.4	4.67	
Shelby City	93	30	66.0	3.03	
Shelbyville	93	33	66.9	3.40	
Taylorsville	87	34	64.8	4.97	
Warfield				2.87	
Williamsburg	94	36	68.8	3.65	
Williamstown	92	40	67.0	2.65	
Louisiana.					
Abbeville	97	47	78.1	3.36	
Alexandria	101	43	76.6	4.51	
Amite	96	45	77.2	5.38	
Baton Rouge	93	47	76.8	6.51	
Burnside	94	45	77.6	6.93	
Calhoun	94	40	71.3	5.73	
Cameron	93	52	78.0	8.48	
Cheneyville	98	43	75.6	7.73	
Clinton	90	47	75.3	7.59	
Collinston	99	41	73.0	6.94	
Covington	98	44	79.2	3.42	
Donaldsonville	98	50	78.4	5.20	
Emilie	91	48	76.9	3.38	
Franklin	97	50	78.8	6.43	
Grand Coteau	94	47	76.6	6.76	
Hammond	93	44	76.8	4.17	
Houma	94	44	77.9	5.12	
Jennings	97	44	76.6	10.94	
Lafayette	98	46	77.3	4.33	
Lake Charles	98	51	78.4	5.48	
Lake Providence	92	46	72.9	6.35	
Lakeside	98	50	77.8	3.46	
Lawrence	95	58	79.2	6.38	
Libertyhill	98	45	74.6	7.65	
Mansfield	95	41	72.4	9.41	
Melville	95	44	76.0	5.00	
Minden	102	44	74.9	5.14	
Monroe	96	46	73.5	7.59	
New Iberia				4.50	
Opelousas	97	44	77.0	6.56	
Oxford	95	48	69.4	8.46	
Paincourtville	93	48	76.0	10.70	
Plain Dealing	95	42	72.0	9.18	
Rayne	100	49	78.2	7.65	
Reserve	95	49	76.8	4.32	
Robeline	98	40	74.0	4.80	
Ruston	100	41	73.6	5.80	
Schriever	94	45	77.6	5.70	
Sugar Experiment Station	92	32	78.4	6.18	
Sugartown	94	51	76.6	7.93	
Venice	94	35	79.3	4.89	
Wallace	94	47	77.8	4.45	
Maine.					
Bar Harbor	84	37	59.4	2.50	
Belfast	82	33	57.9	1.84	
Bemis	80	32	52.4	2.62	
Carmel	84	31	56.2	2.06	
Cornish	90	35	59.0	6.68	
Fairfield	86	35	60.2	1.86	
Farmington	87	30	58.6	3.60	
Fort Fairfield [f]	82	29	58.8	3.10	
Gardiner	85	36	60.6	3.22	
Houlton	83	33	59.2	4.10	
Kineo	74	35	57.8	5.46	
Lewiston	92	38	60.2	3.70	
Mayfield	80	32	57.5	4.33	
North Bridgton	89	35	60.2	4.11	
Orono	82	30	59.0	1.94	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maine—Cont'd.	°	°	°	*Ins.*	*Ins.*
Patten	80	27	57.2	4.30	
Rumford Falls	87	31	57.0	3.88	
The Forks				5.39	
Vanburen	81	27	57.9	5.64	
Vanceboro	75	48	62.5	2.60	
Winslow				2.29	
Maryland.					
Annapolis				6.70	
Bachmans Valley	88	36	63.1	6.87	
Boettcherville	97	32	66.5	1.86	
Cambridge	94	46	69.0	4.49	
Chase	88	38	66.0	7.03	
Cheltenham	92	41	65.5	4.85	
Chestertown	85	46	66.3	6.83	
Chewsville	101	31	67.0	1.64	
Clearspring	95	42	65.0	2.56	
Collegepark	89	38	65.2	7.39	
Colora				12.93	
Cumberland *b*				1.38	
Darlington	85[b]	41[b]	64.3[b]	9.50	
Deerpark	80	25	58.4	2.92	
Denton	89	41	67.6	4.80	
Easton	89	43	68.8	4.90	
Fallston	91	41	67.6	9.09	
Frederick	93	38	66.9	3.66	
Grantsville	85	29	59.0	3.15	
Greatfalls	96	40	66.4	7.09	
Greenspring Furnace	95	36	65.5	1.48	
Hancock	97	30	64.6	1.38	
Harney				3.91	
Jewell	91	45	66.8	5.51	
Johns Hopkins Hospital	92	46	67.5	7.07	
Laurel	92	39	65.6	11.42	
McDonogh	91	40	65.8	5.70	
Mount St. Marys College	92	42	66.5	3.62	
Newmarket	92	40	65.8	3.92	
Pocomoke	88	46	68.4	6.67	
Princess Anne	85	42	66.8	5.26	
Solomons	89	57	69.6	4.91	
Sudlersville	93	41	67.7	6.68	
Sunnyside	83	27	59.9	4.28	
Takoma Park	91	43	66.6	8.60	
Taneytown	87	39	65.0	3.79	
Van Bibber	87	48	66.1	8.06	
Westernport	93	33	64.0	2.37	
Woodstock	89	42	66.0	7.78	
Massachusetts.					
Amherst	86	35	60.9	5.83	
Bedford	86	39	60.7	4.54	
Bluehill (summit)	89	43	61.4	2.94	
Cambridge	90	41	62.8	3.00	
Chestnuthill	90	39	62.4	3.16	
Cohasset				3.14	
East Templeton *1	84	42	58.6	3.11	
Fallriver	80	45	63.7	3.05	
Fitchburg *a* *1	86	44	59.3	4.53	
Fitchburg *b*	88	38	60.6	4.23	
Framingham	87	36	60.8	4.34	
Groton	87	34	59.4	4.40	
Hyannis	79	46	62.8	3.04	
Jefferson				4.18	
Lawrence	89	40	61.8	3.77	
Leominster				3.76	
Lowell *a*	88	40	63.2	6.29	
Lowell *b*	89	38	61.8		
Ludlow Center	83	33	59.1	4.91	
Middleboro	85	35	61.4	3.10	
Monson	84	34	60.0	4.43	
New Bedford *a*	78	44	62.6	3.92	
Plymouth *1	83	52	63.1	3.87	
Princeton				4.30	
Provincetown	85	47	64.0	1.73	
Salem				2.90	
Somerset *1	88	43	65.9	3.58	
Sterling				3.72	
Taunton *c*	83	33	60.9	3.17	
Webster				5.15	
Westboro	89	39	63.3	4.82	
Weston	85	36	59.9	4.83	
Williamstown	85	36	59.4	4.01	
Winchendon				4.24	
Worcester *b*	88	43	61.8	2.65	
Michigan.					
Adrian	86	40	62.6	5.34	
Agricultural College	82	32	58.7	5.88	
Allegan	85[d]	30[d]	58.0[d]	5.62	
Alma	84	35	60.0	4.27	
Ann Arbor	85	36	61.2	6.41	
Annpere				2.38	
Arbela	83	34	61.1	6.05	
Baldwin	83	31	58.8	3.60	
Ball Mountain	83	33	59.2	6.53	
Baraga	78	22	51.4	0.14	
Battlecreek	84	39	60.6	6.90	
Bay City	83	38	59.9	4.10	
Benzonia	79	38	57.9	4.54	
Berlin	81	35	59.6	5.65	
Berrien Springs	86	35	60.8	5.73	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Big Rapids	79	31	57.2	3.03	
Birmingham	83	34	60.8	5.88	
Boon	77	28	55.0	2.71	
Calumet	70	38	52.4	3.69	
Carsonville	81	35	58.1	2.83	
Caseville				3.36	
Cassopolis	89[d]	34	60.6	4.70	
Charlevoix	86	44	59.5	0.75	
Charlotte	84	34	59.9	6.96	
Chatham	74	25	51.8	2.21	
Cheboygan	82	34	57.6	2.05	
Clinton	86	33	61.2	5.21	
Coldwater	85	35	62.9	5.83	
Deerpark	71	36	54.6	1.86	
Detour	72	39	55.8	1.89	
Dundee	82[e]	35	60.2[e]	5.08	
Eagle Harbor	75	42	55.0	2.27	
East Tawas	80	34	58.3	1.97	
Eloise	83	36	61.2	6.53	
Ewen	74	29	51.5	2.76	
Fairview				2.85	
Fennville	84	37	60.0	6.17	
Fitchburg	83	34	59.6	6.53	
Flint	84	36	59.4	6.43	
Frankfort	74	42	59.0	1.47	
Gaylord	80	29	55.0	3.25	
Gladwin	82	30	57.9	2.60	
Grand Marais	69	33	54.5	2.09	
Grand Rapids	82	32	58.8	4.09	
Grape	86	35	61.2	6.33	
Grayling	82	35	58.1	1.00	
Hagar	85	36	62.0	8.22	
Hanover	84	35	60.2	4.12	
Harbor Beach	82	34	58.4	3.91	
Harrisville	79	36	57.6	1.81	
Hart	80	38	60.4	3.03	
Hastings	84	34	59.6	6.14	
Hayes	81	38	58.7	4.04	
Highland Station				6.15	
Hillsdale	83	34	59.7	5.03	
Humboldt	73	21	50.8	1.37	
Iron Mountain	75	30	54.0	1.88	
Iron River	75	21	52.4	2.65	
Ironwood	78	30	54.3	2.47	
Ishpeming	72	27	52.9	2.05	
Ivan	80	33	56.8	2.60	
Jackson	86	37	61.0	5.00	
Jeddo	83	34	60.2	5.84	
Lake City	78	32	58.8	T.	
Lansing	84	38	59.8	5.94	
Lapeer	84	37	60.4	7.47	
Lincoln	80	21	55.2	1.88	
Mackinac Island	78	40	58.2	2.12	
Mackinaw	83	42	58.1	1.71	
Manceiona	79	34	57.6	3.59	
Manistee	88				
Manistique	75	33	54.6	1.94	
Menominee	78	33	56.5	2.38	
Midland	87	34	62.7	1.98	
Mio	77	32	54.6	1.95	
Mount Clemens	90[f]	34[e]	59.2[e]	3.43	
Mount Pleasant	85	36	59.2	2.09	
Muskegon	78	40	60.5	4.15	
Newberry	75	27	49.0	2.40	
North Marshall	84	36	60.0	7.10	
Old Mission	79	42	58.8	2.61	
Olivet	79	38	59.4	7.44	
Omer	85	29	57.6	2.12	
Onaway	82	32	57.9	1.80	
Ontonagon	81	31	54.9	3.46	
Ovid	84	37	60.4	5.26	
Owosso	90[c]	35[e]	61.0[d]	7.11	
Petoskey	83	40	59.6	0.23	
Plymouth				5.10	
Port Austin	80	35	58.2	2.79	
Powers	87	30	54.6		
Reed City	78[e]	33[e]	57.4[e]	3.36	
Roscommon	78	28	57.0	0.38	
Saginaw	84	36	60.8	5.81	
St. Ignace	84	40	59.2	2.12	
St. Johns	85	37	61.0		
St. Joseph	83	40	62.8	4.37	
Sidnaw	79	19	49.4		
Somerset[e]	82	33	58.6	4.08	
South Haven	82	41	60.1	6.25	
Thomaston	75	20	51.4	2.96	
Thornville	81	40	59.8	5.90	
Vans Harbor	81	35	58.4	2.48	
Vassar	85	30	58.6	4.83	
Wasepi	82	37	60.0	5.91	
Waverly	83	35	60.0	3.72	
Webberville	82	34	60.2	6.57	
West Branch	79	34	56.2	2.23	
Wetmore	72	23	50.6	2.23	
Whitefish Point	71	38	54.8	3.06	
Ypsilanti	83	31	59.0	7.28	
Minnesota.					
Ada[e]	78	24	53.6	1.02	
Minnesota—Cont'd.					
Albert Lea	81	30	55.4	5.37	
Alexandria	84	27	53.2	0.43	
Angus	84	24	50.7	0.92	
Ashby	84	24	54.5	0.18	
Beardsley	96	19	55.0	0.06	
Beaulieu	81	23	52.4	0.67	T.
Bemidji	80	32	54.3	0.73	
Bird Island	85	29	56.0	1.95	
Blooming Prairie	81	33	55.9	3.60	
Caledonia	78	31	56.0	4.04	
Campbell	82	21	54.0	0.28	
Collegeville	84	37	56.4	1.29	
Crookston	74	29	53.6	1.27	
Currie	87	26	55.6		
Deephaven				4.66	
Detroit City	84	24	53.6	0.32	
Faribault	83	30	56.4	4.91	
Farmington	82	34	57.0	3.63	
Fergus Falls	87	26	54.9	0.66	
Glencoe	88	24	53.0	3.42	
Grand Meadow	80	32	56.2	2.19	
Hallock	83	22	52.8	1.76	
Lake Winnibigoshish	76	33	52.6	0.85	
Leech	81	26	52.8	0.77	
Long Prairie	86	29	55.6	0.51	
Luverne	82	30	55.8	5.00	
Lynd	80	27	55.8	1.99	
Mapleplain	83	30	56.7	4.14	
Milaca	83[d]	21[d]	54.8[d]	2.41	
Milan[f]	93	21	55.3	0.60	
Minneapolis[b]	83	30	56.0	4.52	
Montevideo	89	24	56.4	0.73	
Morris	80	24	54.4	1.20	
Mount Iron	80	25	51.4	2.52	T.
New London	90	28	56.1	2.00	
New Richland	81	32	58.0	2.81	
New Ulm	85	31	56.6	3.08	
Park Rapids	80	24	51.1	0.90	
Pine River	80	27	53.4	0.85	
Pipestone	76	27	53.2	1.85	
Pleasant Mounds	82[b]	32[b]	57.6[b]	2.59	
Pokegama Falls	80	24	50.2	1.76	
Redwing[a]				4.01	
Redwing[b]	81	37	59.4		
Reeds				2.71	
Rolling Green	80	32	56.2	2.88	
St. Cloud	85	30	57.4	2.19	
St. Peter	81	27	58.0	2.52	
Sandy Lake Dam	80	28	52.9	1.20	
Shakopee	83	31	57.5	3.90	
Tower	76	25	51.6	4.90	
Two Harbors	71	28	50.0	2.28	
Wabasha	86	30	60.1	3.08	
Willow River	82	22	54.4	1.56	
Winnebago City	84	31	57.0	3.31	
Winona	80	31	58.6	1.46	
Worthington	82	30	54.6	2.53	
Mississippi.					
Aberdeen	93	34	71.4	3.22	
Agricultural College	92	45	72.6	2.67	
Austin	90			7.04	
Batesville	93	36	69.4	4.25	
Bay St. Louis	94	58	78.8	5.06	
Biloxi	93	52	78.6	4.85	
Booneville	87	43	70.3	3.33	
Brookhaven	94	43	73.5	5.22	
Canton	93	41	73.6	2.73	
Columbus	88	44	71.8	3.75	
Corinth	90	38	69.3	4.22	
Crystalsprings	93	45	74.0	6.79	
Duck Hill	96	36	72.0	4.61	
Edwards	97	44	75.1	6.24	
Fayette	90	43	73.0	11.26	
Fayette (near)[e][b]	90	50	76.2		
Greenville[a]	89	48	72.0	5.46	
Greenville[b]	96	45	73.5	5.17	
Greenwood	95	41	70.9	7.13	
Hattiesburg	95	43	75.4	7.17	
Hazlehurst	96	45	75.5	5.33	
Hernando	91	42	69.0	2.83	
Holly Springs	91	45	70.1	2.73	
Indianola	92	41	71.8	6.65	
Jackson	97	42	75.8	4.50	
Kosciusko	95	42	73.0	6.53	
Lake	91	40	72.1	4.36	
Lake Como	95	39	74.3	3.22	
Leakesville	94	44	76.5	5.87	
Louisville	95	41	73.8	5.62	
Macon	96			4.89	
Magnolia	93	40	75.4	5.01	
Natchez	93	48	75.8	6.22	
Nittayuma	92	42	71.6	6.62	
Okolona	98	39	73.2	2.57	
Palo Alto	92	41	72.8	2.94	
Patmos				6.91	
Pearlington	96	44	77.5	5.73	
Pittsboro	95	38	71.6	3.55	
Pontotoc	88	40	70.6	4.56	
Mississippi—Cont'd.					
Poplarville	93	49	77.4	3.33	
Port Gibson	97	41	74.5	8.29	
Ripley	92	39	69.8	5.47	
Shoccoe	88	46	74.4	3.28	
Stonington[e][b]	90	48	73.7	8.09	
Suffolk	93	44	74.7	4.37	
Swartwout	95	49	78.3	8.76	
Thornton	93	42	73.5	5.73	
Tupelo	94			4.11	
University	94	44	71.9	5.94	
Walnutgrove	89	42	73.0	3.45	
Watervalley	95	43	72.4	5.36	
Waynesboro	95	42	75.9	5.57	
Woodville	92	46	75.8	3.80	
Yazoo City	95	41	72.8	5.05	
Missouri.					
Appleton City	87	36	63.4	6.98	
Arthur	86	34	64.1	6.87	
Avalon	84	35	64.2	6.47	
Bethany	81	32	60.8	10.66	
Birchtree	87	39	64.5	4.90	
Boonville				6.87	
Brunswick	85	37	61.8	4.48	
Carrollton				6.02	
Caruthersville	93	36	68.6	3.49	
Conception	82	39	61.0	6.17	
Darksville	87	34	63.5	4.35	
Dean	90	32	64.5	4.19	
Desoto				4.19	
Downing				5.07	
Edgehill[e][b]	82	34	61.4	2.92	
Edwards	86	34	63.2	5.08	
Eightmile[e][3]		37	58.2	4.77	
Eldon	82	33	62.3	2.61	
Fairport				6.74	
Fayette	86	37	64.8	6.20	
Fulton	86	33	63.0	2.62	
Gallatin[e][b]	84	39	62.0	5.10	
Glasgow	84	34	62.9	3.64	
Gorin				4.10	
Grant City	83	38	61.3	7.61	
Halfway	85	34	63.9	7.76	
Harrisonville	85	33	62.2	5.15	
Hazlehurst				5.83	
Hermann				1.81	
Houston	86	34	63.6	2.61	
Huntsville	84	35	62.8	4.26	
Ironton	89	30	63.4	3.69	
Jackson	88	33	64.8	4.65	
Jefferson City	88	33	63.4	3.80	
Joplin	86	39	66.3	6.76	
Kidder	84	34	61.8	4.76	
Lamar	88	36	65.1	8.66	
Lamonte				5.91	
Lebanon	85	35	63.8	3.85	
Lexington	85	36	63.6	3.59	
Liberty	85	31	62.6	5.84	
Louisiana	85	32	62.1	3.62	
Macon	87	34	62.8	3.69	
Marblehill	88[c]	31[c]	64.0[c]	4.64	
Marshall	89	32	61.8	3.33	
Maryville	84	38	60.2	8.05	
Mexico	86	32	62.6	2.28	
Miami[e][b]	87	39	64.0	3.83	
Monroe City	83	33[e]	61.1[e]	2.13	
Montreal	85	33	63.0	3.38	
Mountaingrove	84	35	63.0	4.12	
Mount Vernon	94	32	65.6	5.14	
Neosho	86	32	64.9	6.00	
Nevada				5.92	
New Haven	87	39	65.0	2.81	
New Madrid[b]				2.92	
New Palestine	89	34	63.4	5.60	
Oakfield	85	37	64.0	2.14	
Olden	85	36	63.8	6.70	
Oregon	85	36	62.2	7.69	
Palmyra[e][b]	84	34	62.2	2.00	
Phillipsburg				2.75	
Pine Hill				5.66	
Poplarbluff	90[b]	36[b]	64.2[b]	4.84	
Potosi (near)	86	30	61.8	3.58	
Princeton	86	34	61.2	7.38	
Rockport				4.83	
Rolla				2.57	
St. Charles	85	36	64.2	2.03	
St. Joseph				4.06	
Sarcoxie				6.11	
Sedalia	84	36	63.0	6.99	
Seymour	82	32	62.0	4.19	
Shelbina				5.58	
Sikeston	89	36	66.2	4.65	
Steffenville	85	33	62.4	3.92	
Sublett	81	31	61.2	5.63	
Trenton	80	37	61.3	5.16	
Unionville	80	38	60.6	6.25	
Vichy	87	34	63.0	2.80	
Warrensburg	85	36	62.6	5.06	
Warrenton	87	36	63.0	3.50	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wheatland				10.92	
Willowsprings	95	32	62.8	5.18	
Zeitonia	89	31	64.4	3.57	
Montana.					
Adel	81	17	49.9	0.78	8.0
Anaconda	85	22	52.0	T.	
Augusta	83	23	49.9	0.36	
Boulder	82	24	51.4	0.41	T.
Bozeman	82	27	52.0	2.07	
Butte	78	28	51.6	0.10	
Canyon Ferry	87[f]	27	55.6[e]	0.35	T.
Columbia Falls	80	26	50.2	1.48	
Crow Agency	92	28	56.2	0.45	
Culbertson	86	15	52.9	T.	
Deerlodge	81	20	50.0	.....	
Dillon	81	21	51.1	0.24	T.
Ekalaka	85	26	56.0	.....	
Fort Benton (*a*)	84	30	54.4	0.00	
Fort Benton (*b*)	.....	.....	.....	0.13	
Fort Logan	80	21	48.6	T.	
Glasgow	92	22	55.4	0.15	
Glendive	90	26	55.4	0.15	
Greatfalls	83	28	56.7	0.74	T.
Lewistown	85	23	50.8	0.40	
Livingston	89	31	57.6	0.80	
Manhattan	85[f]	25[f]	52.8[f]	1.14	1.0
Marysville	80	26	50.6	0.43	3.0
Missoula	85	28	56.1	0.46	
Ovando	83	16	48.0	0.81	
Parrot	85	19	54.1	0.45	
Plains	82	28	54.7	0.57	
Poplar	91	22	55.4	0.39	
Ridgelawn	88	18	56.3	0.06	
St. Pauls	85	29	54.2	0.78	T.
St. Peter	80	24	50.9	0.80	1.5
Springbrook	90	25	56.1	0.23	
Toston	85	27	52.4	0.29	
Townsend	85	24	51.2	0.18	
Troy	83	28	52.9	1.51	
Twin Bridges	83[f]	19[f]	48.8[f]	0.10	
Twodot	80	22	49.0	0.50	
Utica	.....	26	.....	0.32	
Nebraska.					
Agate	.....	.....	.....	1.38	
Agee *1	93	30	56.9	6.92	
Albion	90	28	59.8	3.58	
Alliance	.....	.....	.....	2.55	
Alma	97	30	62.2	3.75	
Ames	88	29	62.0	3.24	
Ansley	96	24	57.6	3.19	
Arapahoe	.....	.....	.....	2.80	
Arborville *1	84	34	56.6	3.69	
Arcadia	90	28	61.4	3.40	
Ashland *a*	87	32	62.8	2.70	
Ashland *b* *1	.....	.....	.....	2.80	
Ashton	.....	.....	.....	4.62	
Auburn	87	30	62.6	4.98	
Aurora	86	30	60.6	5.68	
Bartley	.....	.....	.....	2.78	
Beatrice	87	30	62.0	5.13	
Beaver	99	32	63.8	2.57	
Bellevue	.....	.....	.....	2.59	
Benedict	.....	.....	.....	3.41	
Benkleman *1	30	96	58.3	3.70	
Blair	86	33	59.5	3.72	
Bluehill *1	85	35	61.9	5.30	
Bradshaw	.....	.....	.....	5.50	
Bridgeport	95	20	58.0	3.32	
Brokenbow	96	24	59.0	3.93	
Burchard	.....	.....	.....	4.20	
Burwell	.....	.....	.....	5.01	
Callaway	100	24	58.4	3.95	
Cedar Rapids	.....	.....	.....	3.77	
Central City	.....	.....	.....	3.29	
Chester	.....	.....	.....	5.05	
Cody	.....	.....	.....	0.08	
Columbus	87	32	59.1	1.78	
Crete	87	33	62.1	4.69	
Culbertson	.....	.....	.....	3.47	
Curtis	96[b]	26[b]	61.6[b]	2.80[b]	
David City	90	32	61.8	3.07	
Dawson	86	33	63.1	3.97	
Edgar	.....	.....	.....	3.74	
Ericson	.....	.....	.....	4.00	
Ewing	.....	.....	.....	4.03	
Fairbury	90	29	60.0	4.33	
Fairmont	89	29	59.9	3.68	
Fort Robinson	96	23	58.5	1.61	
Franklin	95	29	58.8	7.40	
Fremont	90	28	59.6	2.90	
Fullerton	.....	.....	.....	3.27	
Geneva	91	29	59.0	4.16	T.
Genoa (near)	90	30	59.2	2.15	
Gering	94	21	59.8	4.12	
Gordon	.....	.....	.....	0.30	
Gosper	.....	.....	.....	2.78	
Gothenburg	97	28	59.1	3.97	
Grand Island *b*	90	28	60.6	4.62	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grand Island *c*	93	31	61.0	4.06	
Greeley	.....	.....	.....	3.95	
Guide Rock	90	30	61.2	5.91	
Haigler	.....	.....	.....	2.61	
Hartington	91	33	58.0	4.85	
Harvard	88	28	60.1	4.91	
Hastings *1	85	37	60.4	3.80	
Hayes Center	.....	.....	.....	5.00	
Hay Springs	95	26	57.8	1.62	
Hebron	87	32	60.8	4.70	
Hickman	.....	.....	.....	5.34	
Holbrook	.....	.....	.....	3.30	
Hooper *1	85	32	59.2	4.27	
Imperial	100	24	60.2	4.24	
Johnstown	.....	.....	.....	4.70	
Kennedy	95	28	58.7	1.89	
Kimball	93	22	56.1	3.41	
Kirkwood *1	95	29	56.9	4.64	
Laclede	90	30	60.2	2.80	
Lexington	92	27	58.6	2.64	
Loup	93	25	58.8	4.80	
Lynch	.....	.....	.....	2.98	
Lyons	.....	.....	.....	3.64	
McCool	90	32	61.4	3.40	
McCool Junction	.....	.....	.....	3.96	
Madison	87	30	58.6	2.74	
Marquette	.....	.....	.....	4.35	
Minden *a*	92	28	59.6	5.16	
Monroe	.....	.....	.....	1.86	
Nebraska City *b* *1	83	34	63.0	4.45	
Nemaha	90	40	63.6	4.06	
Nesbit	98	27	58.2	3.04	
Norfolk	90	25	59.6	3.93	
North Loup	93	26	59.6	4.22	
Oakdale	90	26	57.4	3.74	
Odell	.....	.....	.....	3.40	
O'Neill	95	26	58.6	6.57	
Ord	90	26	56.9	4.09	
Osceola	.....	.....	.....	2.67	
Palmer	.....	.....	.....	4.93	
Palmyra *1	84	40	59.7	6.03	
Pawnee City	.....	.....	.....	2.51	
Plattsmouth *b*	.....	.....	.....	2.18	
Purdum	96	27	57.0	3.04	
Ravenna *a*	93	27	59.5	5.35	
Ravenna *b*	.....	.....	.....	5.74	
Redcloud	92	29	61.5	5.75	
Republican *1	94	38	63.8	5.41	
Rulo	.....	.....	.....	6.57	
St. Libory	.....	.....	.....	3.26	
St. Paul	94	29	61.2	3.87	
Salem *1	80	40	62.8	4.13	
Santee	96	28	61.5	5.94	
Schuyler	.....	.....	.....	3.06	
Seward	86	29	61.0	4.00	
Smithfield	.....	.....	.....	3.36	
Spragg	.....	.....	.....	5.94	
Springview	92	27	59.0	1.99	
Stanton	87	28	59.6	3.91	
Strang *1	86	32	61.6	3.30	
Stratton	.....	.....	.....	4.77	
Superior	91	32	61.0	4.52	
Syracuse	.....	.....	.....	4.70	
Tablerock *1	86	32	60.0	2.75	
Tecumseh *b*	89	30	60.8	.....	
Tecumseh *c*	.....	.....	.....	3.82	
Tekamah	89	30	62.0	3.41	
Turlington	85	37	61.3	4.31	
University Farm	88	29	62.0	3.94	
Wakefield	87	25	59.4	3.56	
Wallace	.....	.....	.....	3.25	
Wauneta	.....	.....	.....	4.00	
Weeping Water	83	26	58.6	3.15	
Westpoint	90	29	62.2	4.16	
Wilber *1	86	32	59.4	4.49	
Willard	.....	.....	.....	3.20	
Wilsonville	.....	.....	.....	2.20	
Winnebago	.....	.....	.....	3.74	
Wisner	.....	.....	.....	3.34	
Wymore	86	36	61.2	4.29	
York	89	30	63.4	4.50	
Nevada.					
Ames	93	10	55.7	0.24	
Austin	84	28	59.4	0.34	
Battle Mountain	101	20	63.2	0.19	
Belmont	89	26	60.0	T.	T.
Beowawe *1	.....	.....	.....	T.	
Butler	91	23	58.8	T.	
Candelaria	95	33	68.2	T.	
Carson City	93	23	60.4	0.15	
Cranes Ranch	.....	.....	.....	0.12	
Elko (near)	92	16	55.4	0.00	
Ely	88	24	57.4	0.86	T.
Eureka	92	21	61.0	1.00	5.0
Golconda *1	91	29	63.8	0.32	
Halleck *1	92	18	57.8	0.25	T.
Hawthorne	93	30	66.4	0.00	
Humboldt	90	30	61.0	0.25	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lewers Ranch	95	29	63.5	0.25	
Lovelocks	92	38	64.4	0.00	
Martins	97	23	62.0	0.12	
Mill City *1	92	33	64.4	0.50	
Monitor Mill	88	16	55.6	0.44	0.2
Morey	96	29	64.4	0.12	
Palisade	96	21	58.2	0.00	
Palmetto	90	20	61.0	0.38	T.
Potts	94	20	56.0	0.01	T.
Reno State University	94	31	62.6	0.09	
Rioville	113	46	84.0	0.00	
Silverpeak	96	32	66.9	0.00	
Sodaville	99	30	66.8	T.	
Tecoma	98	23	59.8	0.84	
Toano *1	90	.....	.....	0.27	
Wabuska	100	19	61.4	T.	
Wadsworth	98	27	64.1	0.00	
Wells *1	91	39	58.3	0.00	
Wood	89	20	56.9	0.22	
New Hampshire.					
Alstead	84	32	58.5	5.37	
Berlin Mills	88	29	57.2	3.37	
Bethlehem	84	34	57.9	3.35	
Brookline *1	90	32	60.0	4.95	
Chatham	88	32	57.4	6.70	
Claremont	91	34	63.0	6.09	
Concord	89	32	58.8	5.25	
Durham	91	35	59.2	5.74	
Franklin Falls	86	36	59.8	5.30	
Grafton	89	29	57.7	5.42	
Hanover	89	35	58.7	4.70	
Keene	88	31	59.8	4.18	
Littleton	82	31	57.4	3.11	
Nashua	95	35	62.5	4.17	
Newton	88	32	59.2	3.62	
Peterboro	88	31	59.2	4.52	
Plymouth	90	33	60.2	5.72	
Saubornton	87	34	58.2	5.13	
Stratford	81	30	58.3	5.22	
New Jersey.					
Asbury Park	86	46	65.6	3.69	
Barnegat	86	44	66.2	5.05	
Bayonne	90	44	66.0	4.46	
Belvidere	87	38	63.7	8.83	
Bergen Point	87	43	64.6	4.53	
Beverly	92	42	66.3	4.95	
Blairstown	88	35	62.2	6.89	
Bridgeton	92	43	67.8	5.61	
Camden	89	50	66.9	5.34	
Canton	.....	.....	.....	4.80	
Cape May C. H.	88	45	67.4	6.09	
Charlotteburg	84	30	60.8	7.86	
Chester	86	39	60.8	7.04	
Clayton	90	41	66.0	4.05	
College Farm	87	40	64.4	5.25	
Culvers Lake	.....	.....	.....	8.56	
Dover	88	36	60.1	7.06	
Egg Harbor City	88	40	65.3	5.30	
Elizabeth	89	41	64.6	5.14	
Englewood	87	46	65.6	4.33	
Flemington	88	42	65.0	5.92	
Freehold	87	41	63.8	3.70	
Friesburg	89	39	66.0	4.31	
Hanover	85	37	62.2	7.04	
Hightstown	87	43	65.2	5.15	
Imlaystown	88	42	65.8	3.87	
Indian Mills	93	39	65.8	5.01	
Lakewood	89	43	64.4	3.11	
Lambertville	88	41	65.0	5.53	
Layton	86	33	60.7	8.95	
Moorestown	87	43	65.4	5.29	
Mount Pleasant	.....	.....	.....	6.71	
Newark	88	43	63.6	5.05	
New Brunswick	89	41	65.4	5.75	
New Egypt	.....	.....	.....	3.94	
Newton	87	35	62.2	7.99	
Oceanic	88	48	64.8	4.66	
Paterson	87	41	64.7	7.15	
Pemberton	89	39	65.2	4.42	
Perth Amboy	88	44	64.9	4.88	
Piscataway	.....	.....	.....	5.10	
Plainfield	88	39	63.8	5.66	
Rancocas	85	.....	.....	5.44	
Ringwood	87	34	61.2	6.42	
Rivervale	88	34	61.0	7.23	
Roseland	85	35	61.6	6.15	
Salem	90	41	67.2	4.55	
Somerville	89	39	64.4	5.72	
South Orange	84	42	62.8	6.20	
Sussex	86	35	62.8	6.24	
Three Bridges	.....	.....	.....	5.71	
Trenton	86	45	66.4	5.88	
Tuckerton	87	46	66.4	6.20	
Vineland	.....	.....	.....	5.44	
Woodbine	88	42	65.4	7.37	
Woodstown	.....	.....	.....	5.16	
New Mexico.					
Alamagordo	94	45	71.0	0.53	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Albert	98	37	68.2	T.	
Albuquerque	91	38	66.4	0.55	
Bellranch				0.20	
Bluewater	91	25	59.4	0.20	
Cambray				1.53	
Carlsbad	101	44	74.0	1.02	
Clouderoft	70	31	50.4	2.26	
Deming				0.36	
Dorsey	91	29	59.4	4.54	T.
East View	85	30	63.6	1.30	
Engle	90	44	68.0	0.70	
Espanola				0.92	
Folsom	88	27	58.3	0.26	
Fort Bayard	85	41	63.8	2.16	
Fort Stanton	87	29	60.6	0.48	
Fort Union	91	27	59.0	0.55	
Fort Wingate	87	32	62.0	1.62	
Gage				1.10	
Galisteo	84	38	62.2	0.49	
Gallinas Spring	94	36	65.6	0.46	
Las Vegas	93	35	61.0	1.33	
Las Vegas Hot Springs	90	33	61.0	0.94	
Lordsburg				0.40	
Mesilla Park	94	42	69.4	1.22	
Raton	83	31	58.1	0.01	
Roswell	98	37	68.4	3.08	
Strauss				0.42	
Taos	90	31	61.6	0.98	
Willis	79	20	50.9	2.28	
New York.					
Adams	90	40	63.0	2.84	
Addison	85	33	61.2	3.55	
Adirondack Lodge	75	31	54.0	3.33	
Akron				3.43	
Alden	82	38	63.4	2.68	
Angelica	89	35	62.2	4.46	
Appleton	85	38	62.0	3.54	
Arcade	87	29	58.8	4.52	
Athens	86	40	61.9	5.90	
Atlanta	84	30	59.6	2.83	
Auburn	84	38	63.1	1.61	
Avon	82	32	61.0	1.72	
Axton	78	22	54.8	1.26	
Baldwinsville	83	36	62.6	2.35	
Bedford	87	40	63.0	8.35	
Blue Mountain Lake				2.45	
Bolivar	83	27	58.4	2.98	
Bouckville	85	35	60.3	2.99	
Boyds Corners				6.13	
Brockport	82	35	62.2	2.98	
Browns Station				8.67	
Caldwell	86	37	60.6	4.39	
Canaan Four Corners	85	34	59.6	6.14	
Canajoharie	87	32	60.6	4.27	
Carmel	89	41	63.0	6.79	
Carvers Falls	87	36	60.1	3.06	
Cedarhill	80	36	61.2	5.48	
Cooperstown	83	32	58.6	4.39	
Cortland	86	35	62.0	2.51	
Cutchogue	86	47	65.8	5.49	
Dekalb Junction				0.50	
Easton				3.10	
Elba	80	39	60.6	2.13	
Elmira	93	34	62.6	3.53	
Fayetteville	84	39	63.2	2.02	
Franklinville	81	30	60.4	3.40	
Gabriels	78	29	57.2	1.91	
Gansevoort				3.90	
Glens Falls	83	38	62.4	3.85	
Gloversville	88	32	59.5	4.28	
Greenwich	87	36	61.2	3.00	
Griffin Corners	83	27	57.0	8.23	
Harkness	80	36	62.2	1.77	
Haskinville				4.33	
Hemlock	79	42	62.8	2.27	
Honeymead Brook	85	36	61.0	6.62	
Humphrey	79	32	59.0	6.20	
Indian Lake	81	27	56.9	3.28	
Ithaca	85	36	61.1	2.70	
Jamestown	88	31	61.2	4.18	
Keene Valley	80	30	58.6	2.79	
King Ferry				2.42	
Liberty	85	32	57.8	8.24	
Littlefalls, City Res.	87	32	60.4	3.77	
Lockport	80	41	62.2	2.76	
Lowville	80	32	60.0	2.39	
Lyndonville				2.26	
Lyons	86	38	64.4	2.57	
Meredith	83	31	56.5	6.69	
Middletown	83	41	61.3	5.53	
Mohonk Lake	80	40	59.6	7.69	
Moira	83	35	61.6	1.36	
Newark Valley				4.43	
New Lisbon	84	28	57.0	3.05	
North Hammond	80	42	63.2	1.46	
Number Four	76	32	57.6	2.72	
Nunda				3.05	
Oglensburg	79	40	62.4	0.88	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Old Chatham				4.09	
Oneonta	90	32	61.0	2.59	
Oxford	83	31	59.7	3.97	
Penn Yan	83	40	62.9	2.45	
Perry City	82	32	59.5	2.40	
Plattsburg	79	33	59.0	1.80	
Port Jervis	86	38	61.8	8.01	
Primrose	88	39	62.4	7.36	
Redhook				7.29	
Richmondville	87	33	59.8	4.49	
Ridgeway	81	42	62.5	3.17	
Rome	84	33	60.0	3.36	
Romulus	83	40	61.6	3.68	
Salisbury Mills				6.52	
Saranac Lake	78	28	58.2	1.28	
Saratoga	94	34	63.9	4.43	
Scottsville				2.01	
Setauket	87	48	64.8	6.63	
Shortsville	84	39	62.7	1.66	
Skaneateles				1.96	
Southampton	78	47	64.4	8.94	
South Canisteo	87	30	59.0	3.32	
Southeast Reservoir				6.73	
South Kortright	86	29	58.0	5.24	
South Schroon	82	32	57.6	4.02	
Speer Falls	91	37	61.2	4.16	
Straits Corners	84	30	58.5	3.29	
Ticonderoga	85	38	61.5	4.48	
Volusia	80	39	60.6	4.89	
Walton	87	32	60.0	6.34	
Wappinger Falls	87	37	61.6	5.72	
Warwick				5.77	
Watertown	81	36	62.1	2.40	
Waverly	88	31	61.6	3.98	
Wedgwood	82	40	60.4	2.73	
Wells	86	28	58.8	4.88	
West Berne	91	31	60.0	5.38	
West Chazy	79	37	59.8		
Westfield *b*	82	40	62.4	4.33	
Westfield *c*	81[x]	42[x]	60.2[x]	3.14	
Windham	87	30	58.3	7.68	
Wolcott	85	37	61.8	2.46	
Youngstown				4.25	
North Carolina.					
Brevard	88	36	64.4	4.76	
Brewers	92	37	65.6	6.96	
Bryson City				4.77	
Chapelhill	93	44	70.6	4.51	
Cranberry	75	39	59.8	5.93	
Currituck				5.67	
Durham				4.43	
Edenton	90	48	70.8	4.30	
Fayetteville	95	45	71.9	5.24	
Flatrock	87	33	64.1	7.40	
Goldsboro	92	47	70.8	3.57	
Graham				4.52	
Greensboro	89	46	68.6	3.32	
Henderson	90	46	69.2	6.05	
Hendersonville	87	37	65.0	5.97	
Henrietta	93	43	69.4	5.93	
Horse Cove	81	39	62.8	11.30	
Hot Springs	87	40	67.3		
Kinston	91	46	72.6	2.76	
Lenoir	93	37	66.0	4.17	
Lexington	88	46	69.0	3.42	
Linville	77	27	56.2	7.09	
Littleton	91	43	67.8	3.98	
Louisburg	91	44	69.3	3.08	
Lumberton	89	52	71.6	3.32	
Marion	93	39	67.8	4.59	
Marshall	85[f]	39[e]	59.6[d]	3.35	
Mocksville	90	41	67.7	2.32	
Moncure	95	39	70.6	4.83	
Monroe	95	36	67.8	4.25	
Morganton	92	37	68.1	3.31	
Mountairy	87	38	65.6	5.35	
Murphy				4.90	
Newbern	89	51	71.8	4.88	
Patterson	87	36	61.9	4.65	
Penelo	93	42	70.1	2.56	
Pittsboro	94	40	70.0	6.03	
Red Springs	96	45	74.6	5.81	
Reidsville	91	43	69.5	2.32	
Rockingham	90	46	70.8	5.14	
Roxboro	93	42	68.4	5.29	
Salem	90	40	67.8	3.26	
Salisbury	94	45	70.2	2.44	
Saxon	92	37	67.0	3.33	
Selma	98	41	71.4	3.30	
Settle	90	45	69.9	4.47	
Sloan	90	47	71.4	2.69	
Soapstone Mount	93	38	67.4	6.61	
Southern Pines *a*				5.74	
Southern Pines *b*	91	45	71.3	5.72	
Southport	94	60	75.9	2.95	
Statesville	89	43	69.6	5.61	
Tarboro	96	45	72.6	4.16	
Waynesville	89[k]	36	63.5	5.55	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Weldon *a*	88	46	68.6	3.29	
Weldon *b*				3.27	
North Dakota.					
Amenia	85[e]	24[e]	53.4[e]	1.12	
Ashley	91	20	52.2	0.49	
Berlin	81	18	52.3	0.98	
Buxton	83	26	53.8	1.34	
Churchs Ferry	95	25	53.2	0.49	
Coalharbor	84	28	54.5	0.29	
Devils Lake	85	29	54.2	0.75	
Donnybrook				0.25	
Edgeley	90	26	56.2	0.95	
Ellendale	78	26	54.0	0.65	
Fargo	90	21	54.0	0.61	
Forman	76	19	51.6	0.58	
Fort Yates	93	23	58.0	0.24	
Fullerton	91	21	53.7	1.05	
Gallatin	82	15	50.2	0.78	
Glenullin	90	27	55.5	0.18	
Grafton	80	28	53.1	1.20	
Hamilton	84	26	52.8	1.62	
Hannaford	88	20	50.2	1.15	
Jamestown	87	22	53.6	1.08	
Langdon	85	22	52.7	0.86	
Larimore	86	26	51.4	1.20	
Lisbon	87	33	53.1	0.87	
McKinney	89	20	51.4	T.	
Medora	89	22	55.4	0.05	
Melville	93[e]	24[e]	51.4[e]	0.43	
Milton	82	23	51.3	1.26	
Minnewaukon	85	23	53.0	0.40	
Minot	87	27	57.8	T.	
Minto	85	24	52.6	1.65	
Napoleon	95	21	54.1	0.78	
Oakdale	87	35	57.0	0.26	
Pembina	80	25	51.6	1.53	
Portal	80	16	51.6	0.08	
Power	83	25	54.7	0.65	
Steele	85	24	54.0		
University	82	25	52.2	2.08	
Wahpeton	87	23	55.2	0.31	
Willow City	88	19	50.6	0.44	
Woodbridge	81	19	50.6	0.55	
Ohio.					
Akron	83	36	62.6	3.67	
Atwater	78	24	61.0	3.35	
Bangorville	87	30	62.1	5.06	
Bellefontaine	82	36	62.6	6.26	
Bement				5.17	
Benton Ridge	84[l]	63[l]	62.1[l]		
Bethany	92	36	66.9	3.55	
Binola				5.14	
Bladensburg	88	29	62.3	2.58	
Blaine				2.84	
Bloomingburg				4.80	
Bowling Green	84	32	62.2	9.25	
Bucyrus	85	32	62.6	5.42	
Cambridge	87	31	64.0	4.13	
Camp Dennison	92	33	66.0	3.88	
Canal Dover	85	33	61.9	3.60	
Canton	84	35	62.3	3.67	
Cardington	85	29	62.2	4.23	
Cedarville				4.58	
Centerburg				4.13	
Chillicothe	94	33	67.0	3.29	
Circleville	90	35	65.4	3.60	
Clarksville	91	34	66.6	4.34	
Cleveland *a*	82	41	63.2	5.81	
Cleveland *b*	83	41	63.1	4.84	
Clifton	86	32	64.8	4.49	
Coalton	92	30	66.0	4.02	
Colebrook	83	33	61.2	3.27	
Coolville				3.23	
Coshocton				2.58	
Dayton *a*				4.96	
Dayton *b*	90	34	65.4	4.95	
Defiance	85	33	60.7	8.10	
Delaware	89	29	63.0	4.88	
Demos	85	39	64.9	3.66	
Dunham				3.52	
Dunkirk				6.98	
Elyria	85	35	62.8	5.42	
Findlay	89	32	64.2	8.46	
Fort Recovery				3.88	
Frankfort	87	33	64.0	4.24	
Fremont	85	35	63.3	7.20	
Galigher				4.06	
Garrettsville	86	31	61.2	3.89	
Granville	90	32	63.7	2.97	
Gratiot	90	35	64.2	3.27	
Green	93	35	65.8	3.83	
Greenfield	88	37	64.7	3.67	
Greenhill	86	30	61.3	3.39	
Greenville	88	34	63.4	3.78	
Hanging Rock	92	37	67.5	4.99	
Hedges	86	31	62.6	5.99	
Hillhouse	84	33	61.2	5.13	
Hiram	84	38	62.1	4.25	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hudson	90	34	62.8	4.60	
Jacksonboro	91	38	65.2	4.89	
Killbuck	87	33	63.1	3.17	
Lancaster	88	33	63.9	2.71	
Lima	86	39	63.4	4.38	
McConnellsville	89	34	64.7	4.06	
McCormack				2.95	
Manara	87	33	63.6	4.13	
Mansfield				3.70	
Marietta	85	40	66.0		
Marion	89	31	64.0	4.37	
Medina	86	33	63.6	5.10	
Milfordton	89	32	62.0	4.76	
Milligan	89	30	63.8	2.46	
Millport	85	31	61.4	3.80	
Montpelier	84	33	60.3	5.57	
Napoleon	84	34	62.6	8.39	
New Alexandria	85	35	63.7	2.51	
New Berlin	85	33	61.6	3.46	
New Bremen	86	32	63.2	3.46	
New Lexington				3.48	
New Richmond	92	36	67.3	3.60	
New Waterford	83	33	61.5	2.09	
North Lewisburg	86	33	63.6	4.80	
North Royalton	83	36	62.8	4.64	
Norwalk	86	34	63.1	6.97	
Oberlin	88	33	63.0	3.97	
Ohio State University	89	32	63.1	4.10	
Orangeville	87	30	61.6	2.17	
Ottawa	88	33	61.6	5.31	
Pataskala	89	32	63.2	3.83	
Philo	90	36	67.0	3.14	
Plattsburg	88	36	64.8	4.34	
Pomeroy	90	35	64.3	3.95	
Portsmouth *a*				2.12	
Portsmouth *b*	91	37	68.2	2.69	
Pulse				3.90	
Red Lion				4.54	
Richfield				6.24	
Richwood	88	31	64.0	4.63	
Ripley	88	33	64.6	4.16	
Rittman	85	31	61.5	7.74	
Rockyridge	86	35	62.8	8.77	
Shenandoah	85	32	61.7	4.87	
Sidney	87	30	63.4	5.62	
Somerset	93	38	67.5	3.13	
Springfield				4.86	
Strongsville				5.58	
Swanton				8.02	
Thurman	94	35	67.7	3.72	
Tiffin	86	36	63.8	7.32	
Upper Sandusky	87	32	63.6	4.89	
Urbana	82	31	61.2	4.73	
Vickery	87	33	63.0	6.42	
Wadsworth				7.09	
Walnut				3.48	
Warren	87	33	62.8	4.18	
Warsaw	90	30	62.6	2.33	
Wauseon	88	32	62.0	7.93	
Waverly	92	33	66.0	5.18	
Waynesville	32	36	64.3	4.90	
Wellington	87	35	63.5	5.13	
Williamstown				6.63	
Willoughby				3.97	
Wooster	85	32	62.7	3.49	
Zanesville				2.59	
Oklahoma.					
Ames	93	36	68.2	5.65	
Arapaho	95	42	72.2	4.99	
Beaver	98	32	66.6		
Blackburn	90	34	63.6	9.09	
Burnett	95	37	68.6	4.96	
Chandler	91	38	67.0	5.70	
Cleo	86	33	64.2	2.45	
Clifton	95	35	68.4	4.17	
Cloud Chief	96	41	69.0	5.26	
Enid	92	39	67.6	4.13	
Fort Reno	99	39	64.9	4.97	
Fort Sill	98	42	69.5	10.80	
Guthrie	95	45	68.0	6.16	
Hennessey	92	43†	68.4°	5.45	
Jefferson	92	36	68.8	3.16	
Jenkins	93	40	68.6	0.97	
Kenton	98	35	66.6	0.14	
Kingfisher	98	39	69.7	6.81	
Mangum	99	43	71.0	5.65	
Newkirk	90	44	65.6	6.75	
Norman	98	37	68.2	5.20	
Pawhuska	90	37	66.0	6.42	
Perry	94	42	68.0	5.14	
Sac and Fox Agency	92	38	70.0	4.39	
Shawnee	94	43	66.2	4.86	
Stillwater	95	37	66.2	4.64	
Taloga	95	33	68.6	3.77	
Temple				6.70	
Ural	94	42	66.4	7.06	
Waukomis	96	40	68.2	7.35	
Weatherford	96	42	69.5	6.82	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon.	°	°	°	*Ins.*	*Ins.*
Albany *a*	91	38	58.3	0.57	
Albany *b*				1.29	
Alpha	91	34	59.6	1.59	
Arlington	96	36	63.9	0.39	
Ashland	99	30	62.6	0.56	
Aurora *1	87	40	61.4	1.49	
Aurora (near)	88	35	59.6	1.63	
Bay City	86	35	54.8	4.44	
Bend	92	12	54.0	0.10	
Beulah	101	17	57.8	0.32	
Blackbutte	91	37	60.2	0.95	
Blalock	98	41	66.4	0.26	
Brownsville *1	86	40	61.1	0.97	
Bullrun				3.05	
Cascade Locks	90	40	61.6	3.09	
Comstock *1	90	37	56.0	0.47	
Coquille				0.91	
Corvallis	91	32	60.1	1.16	
Dayville	92	26	58.8	0.26	
Detroit	96	32	58.8	2.25	
Doraville	86	35	58.4	2.76	
Ella				0.47	
Eugene	91	37	60.2	0.91	
Fairview				1.06	
Falls City	88	33	57.8	1.37	
Gardiner	93	40	60.0	1.08	
Glenora	92	34	58.2	4.65	
Government Camp	80	30	52.9	4.23	
Grants Pass	103	27	62.6	0.20	
Heppner	94	31	63.2	0.59	
Hood River (near)	93	33	60.5	1.04	
Huntington	100	30	64.4	0.20	
Jacksonville	99	31	65.0	0.21	
Joseph	86	21	53.1	0.41	
Junction City *1	79	47	61.9	0.55	
Kerby	102	28	61.5	T.	
Klamath Falls	103	29	64.0		
Lafayette *1	94	40	63.3	0.93	
Lagrande	93	23	57.8	0.59	
Lakeview	93	14	53.0	0.21	
Lonerock	89	29	56.6	0.51	
McKenzie Bridge	99	29	59.8	1.47	
McMinnville	92	31	60.0	1.54	
Merlin	96	36	62.8	0.10	
Monmouth *b* *1	88	36	60.8	0.95	
Monroe				0.94	
Mount Angel	90	33	61.1	0.60	
Nehalem				4.52	
Newberg	92	33	60.5	1.71	
Newport	88	38	54.8	1.75	
Pendleton	98	30	63.2	0.80	
Pine	98	17	56.2	0.06	
Placer				0.30	
Prineville	89	20	59.8	0.24	
Riddles *1	100	38	61.4	0.25	
Riverside				0.31	
Salem *b*	90	32	59.6	0.42	
Sheridan *1	90	40	61.8	1.30	
Silverton	94	38	58.2	1.46	
Siskiyou *1	96	40	65.6	0.63	
Sparta	93	30	58.2	0.35	
Stafford				1.96	
The Dalles	92	36	63.2	0.36	
Toledo	96	35	60.4	1.54	
Umatilla	98	36	65.0	0.67	
Vale	99	20	58.5	0.25	
Wamic	87	26	58.4	0.25	
Warm Spring	95	25	60.2	0.01	
Westfork *1	94	34	58.8		
Weston	90	31	57.4	1.24	
Williams	101	28	61.4	0.16	
Pennsylvania.					
Aleppo	86	33	63.7	3.95	
Altoona	39	32	61.7	1.58	
Athens	89	33	61.5	4.01	
Beaver Dam				1.98	
Bellefonte	90	34	63.9	4.67	
Brookville				2.34	
Browers				5.91	
California	89	38	66.8	2.23	
Cassandra	83	32	60.0	2.02	
Clarion				2.32	
Coatesville	90	38	65.3	8.31	
Confluence				2.39	
Davis Island Dam				2.55	
Derry Station	85	33	63.8	2.79	
Doylestown				6.33	
Driftwood				3.25	
Dushore	85	28	58.2	5.29	
Dyberry	86	30	58.8	8.41	
East Bloomsburg				6.33	
East Mauch Chunk	89	34	62.7	7.90	
Easton	85	38	63.3	8.31	
Ellwood Junction				1.50	
Emporium	80	36	60.5	2.93	
Ephrata	93	37	65.0	4.50	
Everett	91°	32°	61.7°	2.59	
Franklin	86	35	61.8	3.76	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Freeport				2.90	
Girardville				8.44	
Greensboro				2.58	
Hamburg	91	39	64.1	6.06	
Hamlinton	85	34	58.0	11.04	
Hawthorn	88	31	62.2	3.46	
Herrs Island Dam				2.00	
Huntingdon *a*				2.64	
Huntingdon *b*	99	33	62.8	3.21	
Irwin	89	34	63.4	3.59	
Johnstown	89	36	64.2	2.31	
Kennett Square	87	42	64.0	6.89	
Lansdale				4.08	
Lawrenceville	86	31	60.8	4.30	
Lebanon	91	35	63.8	4.43	
Leroy	86	36	60.7	4.67	
Lewisburg	90	36	62.9	6.40	
Lockhaven *a*	92	38	64.4	4.52	
Lockhaven *b*				7.28	
Lock No. 4				1.85	
Lycippus	89	40	65.4	2.03	
Mifflin				4.60	
Oil City				3.06	
Ottsville				7.28	
Parker				1.82	
Philadelphia	88	48	67.0	5.06	
Pocono Lake	80	30	57.7	11.95	
Point Pleasant				7.17	
Pottsville				6.34	
Quakertown	90	36	64.0	7.90	
Reading ‡				6.87	
Renovo *a*	86	40	61.8	3.57	
Renovo *b*				3.48	
Saegerstown	85	30	61.2	3.61	
St. Marys	88	31	58.8	2.23	
Saltsburg				2.02	
Seisholtzville				7.24	
Selinsgrove	88	38	63.6	5.16	
Shawmont				4.31	
Smethport	82	32	59.0	2.23	
Smiths Corners				6.68	
Somerset	88	30	60.4	1.69	
South Bethlehem	84	40	62.6	6.32	
South Eaton	87	37	61.3	8.15	
Spring Mount				7.83	
State College	85	35	61.1	2.59	
Sunbury				2.25	
Swathmore	87	46	65.7	5.10	
Towanda	88	35	61.0	4.58	
Troutrun				6.56	
Uniontown	82	43	66.2	3.01	
Warren	86	33	61.2	4.29	
Wellsboro	82	34	60.8	3.32	
Westchester	88	45	65.6	7.00	
West Newton				1.52	
Wilkesbarre	90	37	62.9	6.82	
Williamsport	88	38	62.7	5.65	
York	93	37	64.6	4.12	
Rhode Island.					
Bristol	76	44	63.8	2.23	
Kingston	83	40	61.9	4.05	
Pawtucket	89	45	64.3	3.87	
Providence *a*	88	46	64.2	6.55	
Providence *c*	87	45	63.0	6.39	
South Carolina.					
Aiken				3.64	
Allendale	91	55	74.4	1.75	
Anderson	92	48	71.5	4.95	
Batesburg	93	49	70.4	2.47	
Beaufort	98	60	76.2	7.97	
Bennettsville	93	45	72.6	1.98	
Blackville	93	52	73.5	4.47	
Bowman	91	50	73.2	1.10	
Calhoun Falls				6.26	
Camden				2.25	
Cheraw *a*	91	48	71.4	2.64	
Cheraw *b*				2.41	
Clemson College	92	43	69.4	5.42	
Conway	92	54	73.4	6.03	
Darlington	93	48	73.0	1.32	
Duewest	89	51	71.5	5.42	
Edisto				3.02	
Effingham				1.76	
Florence	91	49	72.1	1.16	
Gaffney	93	44	71.2	3.38	
Gillisonville	89	55	74.4	5.10	
Greenville	87	44	66.5	4.42	
Greenwood	93	46	72.0	4.98	
Heath Springs	92	43	72.6	1.78	
Kingstree *a*	87	56	71.6	2.17	
Kingstree *b*				2.46	
Liberty	92	45	70.0	5.62	
Little Mountain	92	50	73.0	2.94	
Longshore	93	49	71.4	4.71	
Lugoff	93	49	72.8	2.75	
Pinopolis *1	85	60	73.4	4.47	
St. Georges	89	56	72.4	4.60	
St. Matthews	88	56	72.0	2.55	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Stephens				6.30	
Saluda	93	45	71.4	2.94	
Santuck	92	43	70.2	3.49	
Scivern	95	44	72.6	2.46	
Smiths Mills				6.95	
Society Hill	89	51	71.7	2.00	
Spartanburg	91	44	69.5	5.30	
Statesburg	90	54	73.2	3.10	
Summerville	87	55	72.2	5.56	
Sumter	91	52	71.5	2.03	
Temperance	96	50	73.3	3.24	
Trenton	90	51	72.4	2.32	
Trial	89	50	71.7	3.57	
Walhalla	89	43	66.8	7.40	
Winnsboro	91	51	72.2	2.51	
Winthrop College	90	46	70.6	4.31	
Yemassee	91	56	74.0	6.29	
Yorkville	91	49	72.1	5.23	
South Dakota.					
Aberdeen	95	24	55.6	0.59	
Academy	95	28	60.6	0.70	
Alexandria	95	24	57.8	1.15	
Armour	98	24	56.3	1.92	
Ashcroft	92	22	55.8	0.13	
Bowdle	101	21	56.0	0.35	
Brookings	87	23	54.2	0.26	
Canton	86	23	58.2	2.66	
Centerville				2.22	
Chamberlain	96	26	60.4	0.15	
Clark	94	25	57.3	0.51	
Desmet	89	30	55.4	0.45	
Doland	90	19	55.4	0.35	
Elkpoint	90	28	61.8	4.12	
Farmingdale				0.44	
Faulkton	90	26	55.8	0.45	
Flandreau	88	26	55.6	1.74	
Foresburg	94	?)	58.4	0.15	
Fort Meade	96	32	59.1	0.75	
Gannvalley	97	23	60.0	0.15	
Gary	90	31	54.0	2.12	
Gettysburg				0.20	
Grand River School	96	25	57.6	0.32	
Greenwood	98	28	61.4	3.18	
Highmore				0.40	
Hotch City	96	25	59.4	0.42	
Howard	89	22	53.8	0.64	
Howell	93	21	55.8	0.26	
Ipswich	91	24	53.8	0.64	
Kimball	94	30	58.6	0.34	
Leola				0.40	
Leslie	98	24	58.0	0.35	
Marion	85	25	57.2	1.64	
Mellette	92	24	57.2	0.35	
Menno	93	23	58.6	1.88	
Millbank	96	25	56.4	0.11	
Mitchell	96	24	57.2	0.90	
Oelrichs	96	20	59.7	1.30	
Pedro	99	25	59.8	T.	
Pine Ridge	97	25	58.2	0.60	
Plankinton	99	26	59.2	0.40	
Ramsey	90	17	56.0	1.33	
Redfield	90	24	55.0	0.24	
Rosebud	99	29	60.7	0.58	
St. Lawrence	93	23	56.8	0.12	
Silver City				0.50	
Sioux Falls	88	27	56.6	3.17	
Sisseton Agency	93	30	55.4	0.38	
Spearfish	93	31	56.8	1.38	
Tyndall	94	24	60.0	3.14	
Vermilion	89	29	60.4	5.27	
Watertown				0.13	
Waubay	88	22	53.4	0.30	
Wentworth	92	26	57.7	0.70	
Wessington Springs	93	30	60.3	T.	
Wolsey				0.07	
Tennessee.					
Andersonville	90	42	68.4	5.98	
Arlington	92	38	68.8	2.44	
Ashwood	90[c]	35	68.8	5.88	
Benton	90	40	69.6	6.06	
Bluff City				3.18	
Bolivar	91	38	67.5	4.73	
Bristol	84	36	64.0	2.84	
Brownsville	93	38	70.6	3.15	
Byrdstown	90	35	68.0	5.43	
Carthage	90	43	69.2	4.61	
Clarksville	90	38	69.2	4.73	
Clinton				5.23	
Covington	89	41	69.1	1.75	
Decatur	88	38	68.0	5.69	
Dickson	89	35	68.2	6.35	
Dyersburg	92	37	68.2	1.74	
Elizabethton	88	35	65.7	5.43	
Erasmus	86	33	63.4	4.74	
Florence	87	37	68.5	7.11	
Franklin	95	39	69.6	9.26	
Grace[e1]	96	46	71.1	5.70	
Greeneville	88	35	65.6	3.71	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Harriman	89	41	66.5	6.49	
Hohenwald	90	31	66.0	6.98	
Iron City	91	34	68.3	5.14	
Isabella	86	39	65.6	4.68	
Johnsonville	94	33	69.0	3.80	
Jonesboro[e1]	87	51	65.5	5.40	
Kenton[e5]	90	37	67.9	3.20	
Kingston				5.05	
Lafayette[e5]	90[c]	38[c]	66.2[c]	5.90	
Leadvale				1.28	
Lewisburg	90	34	69.2	4.01	
Liberty	89	39	68.0	7.22	
Lynnville	87	40	68.5	3.65	
McKenzie	96	40	70.8	2.55	
McMinnville	91	36	68.6	7.17	
Maryville	91	41	69.1	4.57	
Milan	93	37	68.0	3.68	
Newport	87	41	68.1	6.75	
Nunnelly	90	32	66.8	4.92	
Oakhill	86	38	66.0	3.81	
Palmetto	90	37	69.6	4.30	
Pope	94	38	70.0	6.30	
Rogersville	93	37	67.8	4.49	
Rugby	85	29	64.6	4.81	
Savannah	92	38	70.7	7.14	
Sewanee	86	38	67.0	5.85	
Silverlake	79	33	60.4	4.67	
Springfield	97	32	67.6	4.85	
Tazewell				5.13	
Tellico Plains	88	38	68.6	5.73	
Tracy City	85	36	65.0	5.39	
Trenton	92	33	68.6	3.01	
Tullahoma	87	40	68.6	6.60	
Union City	91	38	69.0	3.28	
Waynesboro	90	37	69.8	5.80	
Wildersville	85	39	67.9	2.69	
Texas.					
Albany	94	46	72.8	1.43	
Alvin				7.85	
Anna	98	44	71.8	9.05	
Anson				2.00	
Arthur				6.75	
Austin *a*	99	52	79.2	5.61	
Austin *b*[e5]	97	50	75.0	0.00	
Ballinger	99	51	73.8	1.25	
Bastrop	101	55	81.8	10.48	
Beaumont	97	51	79.0	8.24	
Beeville	101	58	83.1	7.68	
Bigspring	96	48	73.2	2.46	
Blanco	98	52	75.8	4.50	
Boerne[e1]	100	51	76.8	2.84	
Booth				7.32	
Bowie	97	48	73.2	4.96	
Brazoria	94	56	78.2	8.74	
Brenham	97	52	77.2	7.04	
Brighton	95	62	81.9	6.36	
Brownwood	98	50	76.4	0.32	
Burnet	101	50	76.0	3.96	
Camp Eagle Pass	102	57	80.6	4.29	
Childress	100	45	71.8	4.07	
Coleman	95	50	72.6	4.41	
College Station	102[b]	48[b]	78.2[b]	3.78	
Colorado	99	45	73.1	2.76	
Columbia	95	57	78.2	10.56	
Comanche	97[c]	44[c]	73.8[c]	1.87	
Corsicana	100	48	75.4	3.46	
Cotulla	101	61	82.7	2.80	
Cuero	101	56	80.6	12.03	
Dallas	103	43	73.8	1.99	
Danevang	100	50	79.8	8.18	
Dublin	98	47	73.3	0.91	
Duval	101	52	78.4	7.23	
Earles Ranch				4.95	
Estelle	99	45	74.2	3.57	
Fort Brown	100	63	83.2	6.90	
Fort Clark	99	52	77.6	0.20	
Fort Davis	89	45	67.2	2.70	
Fort McIntosh	103	69	91.5	0.09	
Fort Ringgold	105	60	85.2	1.75	
Fort Stockton				2.88	
Fredericksburg	99	47	76.4	0.83	
Gainesville	98	43	72.5	4.32	
Georgetown	100	46	75.4	3.88	
Grapevine	100[c]	46[d]	73.9[c]	2.57	
Greenville	102	42	72.2	8.32	
Hale Center	100	43	69.8	2.50	
Hallettsville	97	56	80.0	10.10	
Haskell	105	43	74.8	1.34	
Hearne	98	46	75.4	8.13	
Henrietta	104	45	71.8	4.69	
Hondo				6.35	
Houston	99	55	79.4	6.78	
Huntsville	97	48	77.7	6.76	
Ira	98	48	72.6	2.71	
Jacksonville	94	48	74.7	5.72	
Jasper	96	46	76.9	3.64	
Junction				1.42	
Kaufman	96	47	75.0	6.08	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Kent				0.82	
Kerrville	99	45	78.4	2.72	
Kopperl				1.71	
Lampasas	100	45	74.8	2.03	
Lapara				4.03	
Laureles Ranch				4.00	
Llano[e1]	103	57	77.2	2.10	
Longview	97	47	73.4	5.05	
Luling	100	53	77.0	8.28	
Mann	100	40	74.6	2.76	
Marlin	97	47	76.1	2.76	
Menardville	102	40	73.8	4.96	
Mount Blanco	100	39	69.2	0.10	
Nacogdoches	95	45	74.1	10.03	
New Braunfels	96	56	77.4	7.31	
Panter				3.13	
Paris *a*	100	42	71.6	6.74	
Pearsall	101	55	82.5	1.75	
Port Lavaca	96	61	80.6	10.26	
Rhineland	98	44	72.2	1.53	
Rockisland	100	50	78.0	6.61	
Rockport	89	60	81.8	5.34	
Runge	102	58	81.2	11.56	
Sabine	94	52	77.6	11.20	
San Marcos	97	51	76.4	9.34	
San Saba	101	47	75.2	3.92	
Santa Gertrude Ranch				4.38	
Shaeffer Ranch	104	57	83.4	10.09	
Sherman	99	50	75.2	9.08	
Sugarland	97	51	77.3	9.00	
Sulphur Springs	97	45	72.6	5.81	
Temple *a*	96	50	73.8	5.03	
Temple *b*	96	50	74.7	4.92	
Tulia				2.05	
Tyler	98	47	73.6	4.38	
Victoria	102	56	79.7	9.08	
Waco	102	50	76.4	6.23	
Waxahachie	100	41	71.9	6.35	
Weatherford	100	45	73.5	2.82	
Weimar	99	53	79.6	7.23	
Wichita Falls				6.95	
Wharton	99	53	80.0	9.07	
Utah.					
Aneth	98	37	67.0	0.35	
Blackrock	90	26	58.3	0.84	
Bluecreek[e1]	80	55	67.8	0.00	
Castledale	95	21	59.4	0.29	
Cisco	90	40	64.4	1.00	
Corinne	100	25	60.8	T.	
Coyoto	90	19	54.8	0.30	
Deseret	98	21	59.7	0.40	
Emery	89	31	56.3	T.	
Escalante	90	33	62.0		
Farmington	89[c]	33[c]	61.9[c]	T.	
Fillmore	102	31	65.4	1.51	
Frisco	92	30	62.4	0.47	
Giles	96	28	63.0	0.57	
Government Creek	92	25	62.6	0.50	
Green River	98	33	65.8	1.66	
Grover	93	30	63.8	0.57	
Heber	91	20	55.6	0.45	
Henefer	90	18	54.3	0.89	
Hite	102	43	72.6	0.65	
Huntsville				0.62	
Kelton	90	22	57.0	T.	
La Sal	86	30	58.9	2.03	
Levan	88	29	59.8	0.91	
Loa	83	12	49.6	0.33	
Logan	90	29	60.4	T.	
Manti	90	28	58.8	0.83	
Marysvale	91	26	58.7	0.79	
Meadowville	85	23	54.6	0.40	
Millville				0.12	
Minersville	94	28	62.9	0.97	
Moab	97	34	65.3	1.26	
Monticello	89	40	61.4	2.09	
Mount Nebo	95	29	62.0	T.	
Mount Pleasant	91	28	60.6	0.44	
Ogden	86	31	61.6	0.21	
Parowan	93	26	61.5	0.50	
Pinto	91[c]	23[d]	58.6[c]	0.20	
Plateau	86	25	55.4	1.18	
Ranch	88	22	56.4	0.25	
Richfield	92	26	58.8	0.64	
St. George	103	38	71.7	0.29	
Scipio	95	24	60.0	1.38	
Snowville	92	19	54.8	0.15	
Soldier Summit	87	25	51.4	0.09	
Terrace	94	23	57.4	T.	
Thistle	96	23	57.2	0.85	
Tooele	92	33	63.8	0.18	
Tropic	90	11	54.6	0.22	
Vernal	92	29	60.7	0.99	
Wellington	94	22	58.8	0.31	
Woodruff	88	10	50.3	0.19	
Vermont.					
Burlington	82	42	63.2	3.68	
Chelsea	82	33	56.6	2.93	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Vermont—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cornwall	86	38	61.4	4.04	
Enosburg Falls	79	32	59.6	3.28	
Jacksonville	84	33	56.3	7.92	
Manchester	85	33	60.8	4.06	
Newport	84	32	57.2	1.14	
Norwich	86	30	58.2	4.24	
St. Johnsbury	84	34	59.8	3.75	
Wells	84	36	59.8	3.46	
Woodstock	89	35	61.0	5.85	
Virginia.					
Alexandria	92	45	67.6	4.34	
Ashland	92	40	67.3	4.86	
Bedford	95	39	68.3	1.94	
Bigstone Gap	88	34	64.8	4.58	
Birdsnest [2]	.....	.....	66.7	3.75	
Blacksburg	88	29	63.2	2.22	
Bluemont	90	45	66.3	.....	
Bonair	89	47	67.4	4.80	
Buckingham	.....	.....	.....	3.27	
Burkes Garden	80	28	57.8	2.56	
Callaville	87	43	67.0	3.27	
Charlottesville	90	47	67.2	6.46	
Clarksville	.....	.....	.....	4.45	
Columbia	91	38	67.6	6.30	
Dale Enterprise	92	36	64.8	2.75	
Danville	.....	.....	.....	3.05	
Farmville	94	42	68.0	2.15	
Fredericksburg	90	42	67.0	3.61	
Hampton	87	52	70.6	4.71	
Hot Springs	84	34	66.6	2.28	
La Crosse	92	42	71.8	2.55	
Lexington	90	36	64.6	3.17	
Lincoln	94	40	66.5	4.33	
Manassas	88	41	65.8	2.95	
Marion	85[4]	32[4]	64.6[4]	3.20	
Mendota	.....	.....	.....	3.95	
Newport News	90	52	71.4	3.94	
Petersburg	90	42	68.2	4.43	
Radford	.....	.....	.....	0.96	
Riverton	.....	.....	.....	2.39	
Roanoke	88	38	58.2	2.58	
Rockymount	83	33	62.3	3.08	
Saxe	88[3]	42[3]	64.2[3]	4.12	
Shenandoah	.....	.....	.....	2.96	
Speers Ferry	.....	.....	.....	6.79	
Spottsville	90	42	68.6	5.01	
Stanardsville	93	43	67.3	4.16	
Staunton	92	37	65.7	3.66	
Stephens City	89[4]	37[4]	65.3[4]	1.69	
Warsaw	88	43	68.0	2.03	
West Point	83	40	64.8	2.40	
Wilkerson	92	46	68.0	3.55	
Williamsburg	89	40	65.6	3.91	
Woodstock	94	35	65.2	1.53	
Wytheville	90	34	64.2	2.87	
Washington.					
Aberdeen	82	30	53.9	5.13	
Ashford	.....	.....	.....	4.43	
Bremerton	81	39	57.4	2.25	
Brinnon	82	39	58.0	2.36	
Cedonia	87	30	55.2	0.38	
Centralia	87	32	57.3	2.29	
Cheney	.....	.....	.....	0.98	
Clearwater	82	36	55.0	5.17	
Cle Elum	89	26	54.5	0.87	
Colfax	89	26	55.6	1.14	
Colville	86	24	54.6	0.50	
Conconully	82	29	54.0	0.33	
Connell	.....	.....	.....	0.45	
Coupeville	80	37	55.8	1.97	
Crescent	89	26	55.6	0.29	
East Sound	76	32	54.2	2.21	
Ellensburg	88	26	56.2	0.17	
Ellensburg (near)	88	24	55.8	0.02	
Grandmound	86	32	57.5	2.53	
Granite Falls	.....	.....	.....	4.51	
Hooper	95	32	61.6	0.43	
Ilwaco	83	38	55.8	4.08	
Lacenter	89	33	58.2	2.62	
Lakeside	90	37	61.0	0.23	
Lind	98	35	63.2	0.59	
Loomis	89	36	61.4	0.36	
Lyle	92	36	61.2	0.69	
Mayfield	90	34	57.2	3.77	
Mottinger Ranch	97	39	65.0	0.77	
Mount Pleasant	90	39	60.9	2.54	
Moxee Valley	91	26	58.2	0.10	
Olga	79	44	65.5	1.69	
Olympia	85	34	57.2	2.71	
Pomeroy	96	34	62.2	0.74	
Port Townsend	78	42	56.8	1.47	
Pullman	88	34	58.7	1.22	
Rattlesnake Mountains	88	25	60.0	0.45	
Republic	86	24	53.0	0.35	
Ritzville	.....	.....	.....	0.18	
Ritzville (near)	.....	.....	.....	0.39	
Rosalia	88	26	56.2	1.48	
Sedro	84	33	55.4	3.64	
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Silvana	81	35	55.4	2.44	
Snohomish	77	36	54.9	1.88	
Snoqualmie	81	36	56.9	3.35	
Southbend	87	35	58.8	3.18	
Sprague	.....	.....	.....	1.10	
Stampede	.....	.....	.....	0.93	
Sunnyside	91	30	60.3	0.27	
Trinidad	.....	.....	.....	0.01	
Union	90	35	56.9	2.87	
Usk	.....	.....	.....	1.17	
Vancouver	86	36	58.8	1.92	
Vashon	79	40	57.0	2.91	
Waterville	89	32	54.9	0.05	
Wenatchee (near)	91	34	59.9	0.18	
Whatcom	88	34	55.7	2.07	
Wilbur	87	20	54.5	0.08	
Zindel	95	38	68.1	0.28	
West Virginia.					
Addison	91	36	66.2	2.50	
Bayard	86	29	59.9	3.00	
Beckley	82	26	60.0	2.23	
Beverly	90	34	61.8	4.56	
Burlington	94	31	63.1	2.47	
Byrne	91	36	67.8	3.60	
Cairo	91	33	66.0	0.51	
Camden	84	37	64.6	2.34	
Central	89	32	63.6	3.68	
Chapel	92	38	69.0	2.54	
Charleston	96[e]	41[e]	70.5[e]	3.29	
Clay	95	40	68.8	3.63	
Creston	90	35	64.9	1.23	
Cuba	89	35	65.8	3.34	
Dayton	90	31	63.4	4.80	
Echo	97	33	67.7	2.85	
Elkhorn	86	35	65.2	2.97	
Fairmont	.....	.....	.....	4.34	
Glenville	88	38	64.3	3.23	
Grafton	88	34	64.7	4.68	
Green Sulphur	87	35	61.0	2.63	
Harpers Ferry	.....	.....	.....	1.95	
Hinton *b*	91	41	65.8	1.50	
Huntington	91	39	66.2	2.15	
Josiah	90	38	65.5	2.73	
Leonard	80	38	62.2	3.96	
Lewisburg	88	31	62.0	1.92	
Logan	91	41	67.2	3.55	
Magnolia	98	33	66.1	1.79	
Marlington	88	33	60.0	3.69	
Martinsburg	95	37	64.0	2.60	
Morgantown	85	37	65.4	3.24	
Moscow	84	33	62.7	1.60	
Moundsville	87	39	65.6	3.48	
New Martinsville	93	44	69.2	2.88	
Nuttallburg	91	36	67.4	3.05	
Oldfields	93[f]	31	63.9[e]	2.07	
Parsons	86	36	62.5	3.43	
Philippi	88	34	63.4	3.03	
Pickens	84	34	62.0	3.44	
Point Pleasant	89	40	67.2	2.85	
Princeton	84	36	62.6	2.55	
Romney	95	32	65.6	1.40	
Rowlesburg	.....	.....	.....	3.01	
Southside	89	42	67.8	4.76	
Terra Alta	83	31	60.3	3.05	
Travellers Repose	86	25	58.8	4.28	
Uppertract	91	31	64.2	2.37	
Wellsburg	81	37	62.7	3.76	
Weston	91	36	67.0	2.56	
Wheeling *a*	.....	.....	.....	2.73	
Wheeling *b*	86	45	68.8	3.04	
Williamson	92	40	67.2	2.95	
Wisconsin.					
Amherst	80	29	55.4	3.30	
Antigo	77	28	55.9	0.70	
Appleton	80	34	58.4	1.36	
Ashland	.....	.....	.....	4.10	
Barron	84	22	57.4	2.39	
Bayfield	78	37	56.0	3.87	
Beloit	78	36	58.8	5.17	
Brodhead	85	34	60.0	3.91	
Butternut	79	23	51.6	3.93	
Chilton	79	33	56.5	2.78	
Citypoint	87[f]	32[f]	57.8[f]	3.16	
Darlington	80	25	56.0	3.81	
Delavan	83	35	59.2	4.36	
Dodgeville	80	32	58.4	4.50	
Downing	80	25	55.6	2.45	
Easton	81	26	58.2	3.21	
Eau Claire	81	31	58.6	2.21	
Florence	75	26	53.6	1.94	
Fond du Lac	78	30	58.4	3.05	
Grand River Locks	.....	.....	.....	4.80	
Grantsburg	82	25	54.4	3.55	
Harvey	80	34	58.2	4.17	
Hayward	82	22	55.8	3.96	
Hillsboro	80	26	56.7	2.93	
Koepenick	80	24	54.8	2.50	
Ladysmith	78	26	55.0	2.17	
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lancaster	82	30	57.7	4.25	
Madison	76	37	58.2	4.18	
Manitowoc	76	37	54.5	2.60	
Meadow Valley	84	25	56.8	3.78	
Medford	78	26	57.9	4.15	
Menasha	.....	.....	.....	3.53	
Neillsville	82	26	57.4	3.63	
New Holstein	81	32	57.6	2.36	
New London	81	30	57.4	2.34	
North Crandon	73[e]	25[e]	52.1[e]	1.74	
Oconto	80	33	58.3	2.22	
Osceola	82	23	56.6	3.99	
Oshkosh	78	34	59.7	2.55	
Pepin	86	32	59.4	2.54	
Pine River	80	30	57.4	2.66	
Portage	79	35	59.1	4.04	
Port Washington	81	30	56.2	3.25	
Prairie du Chien *a*	85	32	60.6	3.73	
Prairie du Chien *b*	.....	.....	.....	3.42	
Prentice	76	21	52.9	4.41	
Racine	89	40	61.0	6.80	
Sheboygan	81	38	58.0	2.37	
Stevens Point	80	28	56.6	3.03	
Tomahawk	77	24	53.5	2.60	
Valley Junction	82	29	58.1	2.90	
Viroqua	88	30	58.1	3.40	
Watertown	80	33	57.2	3.69	
Waukesha	79	38	58.0	3.95	
Waupaca	80	32	57.4	3.51	
Wausau	78	28	56.2	3.05	
Westfield	80	28	58.1	2.71	
Whitehall	80	26	57.6	4.28	
Wyoming.					
Alcova	91	29	59.1	0.78	T.
Basin	95	31	59.0	0.08	T.
Bedford	84	17	50.2	0.36	T.
Border	86	13	49.4	0.02	T.
Buffalo	91	24	53.8	0.24	
Centennial	77	28	52.0	0.95	
Chugwater	89	18	55.1	2.30	
Daniel	78	15	45.6	0.80	
Evanston	83	19	52.0	1.00	
Fort Laramie	97	19	58.6	2.10	
Fort Washakie	87	25	56.4	0.56	6.0
Fort Yellowstone	78	25	51.0	0.90	T.
Fourbear	79	19	47.9	1.10	
Griggs	89	22	55.0	0.93	
Irma	85	25	54.5	1.60	
Iron Mountain	84	12	54.5	2.43	2.2
Kimball Ranch	85	30	54.2	0.88	
La Grange	93[d]	19[d]	57.7[d]	3.40	2.0
Laramie	80	17	51.5	1.58	0.5
Leo	83	18	50.4	1.16	T.
Lolabama Ranch	78	15	46.9	0.91	T.
Lusk	92	17	54.6	0.57	T.
Moore	89	22	55.2	1.94	
Parkman	93	28	55.6	0.50	
Pinebluff	94	18	58.2	3.18	T.
Rawlins	90	18	53.6	1.85	
Rocksprings	86	24	55.9	1.45	1.0
Saratoga	86	21	54.4	0.31	
Thayne	83	14	50.0	0.46	
Thermopolis	95	25	58.6	0.31	
Wheatland	94	28[e]	54.0	1.06	
Porto Rico.					
Adjuntas	92	56	73.1	10.33	
Aguadilla	92	68	80.2	6.77	
Aguirre	93[j]	69[j]	81.3[j]	4.63	
Arecibo	89	65	78.8	3.26	
Barros	86	55	74.0	3.33	
Bayamon	97	66	81.4	7.59	
Caguas	91	61	76.4	8.28	
Canovanas	92	73	81.5	5.91	
Cayey	98	58	79.4	6.04	
Cidra	90	57	75.6	4.98	
Coamo	94	60	78.5	1.20	
Fajardo	90	68	81.2	5.49	
Guanica	92	56	79.6	2.67	
Guayama	.....	.....	.....	6.29	
Hacienda Coloso	92	60	78.0	9.28	
Hacienda Perla	99	70	80.5	10.06	
Humacao	91	76	83.2	12.45	
Isabela	89	67	78.4	2.44	
La Isolina	90	62	77.4	7.05	
Las Marias	91	68	78.6	16.60	
Manati	92	65	79.7	3.50	
Maunabo	94	71	82.0	9.63	
Mayaguez	94	63	80.0	7.60	
Morovis	95	66	79.5	8.83	
Ponce	92	67	80.1	4.19	
Rio Piedras	.....	.....	.....	8.95	
San German	94	68	81.7	4.10	
San Lorenzo	93	65	79.0	11.69	
San Salvador	89	60	75.4	13.57	
Santa Isabel	91	68	80.2	3.26	
Utuado	93	66	79.6	10.27	
Yauco	88	68	79.2	4.60	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Mexico.	°	°	°	*Ins.*	*Ins.*
Ciudad P. Diaz	97	60	80.9	6.08	
Coatzacoalcos	92	70	80.4	19.50	
Leon de Aldamas	83	54	68.8	7.30	
Vera Cruz	89	67	81.4	2.60	
New Brunswick.					
St. John	70	37	57.2	3.53	
Late reports for August, 1902.					
Alaska.	°	°	°	*Ins.*	*Ins.*
Kenai	70	35	53.8	2.92	
Point Barrow	58	28	38.0	0.48	
California.					
Gilroy (near)	102	45	67.2	0.00	
San Miguel Island	73	46	59.4	0.00	
Idaho.					
Riddle	.....	.....	.....	0.77	
Iowa.					
Centerville	93	46	70.2	8.99	
Mississippi.					
Aberdeen	104	59	81.8	4.67	
Waynesboro	100	67	83.8	5.95	
Nebraska.					
Ravenna (*b*)	.....	.....	.....	2.91	
New York.					
Boyds Corners	.....	.....	.....	2.91	
Southeast Reservoir	.....	.....	.....	3.24	
Youngstown	.....	.....	.....	0.89	
Ohio.					
North Lewisburg	91	44	69.3	2.20	
Oklahoma.	°	°	°	*Ins.*	*Ins.*
Cleo	105	56	80.8	1.76	
South Carolina.					
Bennettsville	99	58	78.6	3.28	
South Dakota.					
Doland	90	30	67.4	3.15	
Gary	92	41	67.0	2.55	
Leslie	95	36	70.1	5.73	
Texas.					
Fort McIntosh	105	71	92.4	0.00	
Hewett	.....	.....	.....	0.00	
Junction	.....	.....	.....	0.00	
Laureles Ranch	.....	.....	.....	0.00	
Santa Gertudes Ranch	.....	.....	.....	0.00	
Wichita Falls	.....	.....	.....	0.00	
Vermont.					
Norwich	83	38	62.2	3.49	
Virginia.					
Saxe	100	54	73.5	5.40	
Washington.					
Ellensburg (near)	98	38	67.4	0.00	
Ritzville	.....	.....	.....	0.00	
West Virginia.					
Travellers Repose	87	35	64.6	1.43	
Wisconsin.					
Beloit	84	46	67.1	0.83	
Downing	95	36	62.6	2.00	
Wausau	84	38	64.5	4.01	
Wyoming.					
Kemmerer	95	25	60.8	0.21	
Lolabama Ranch	84	25	55.4	0.12	

EXPLANATION OF SIGNS.

*Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

August, 1902, Ohio, Delaware, make mean temperature 68.2°, instead of 68.4°.

August, 1902, Arkansas, New Gascony, make mean temperature 81.8°, instead of 77.2°.

The following changes have been made in the names of stations: Iowa, Ovid changed to Corydon.

TABLE VII.—*Heights of rivers referred to zeros of gages, September, 1902.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Date.	Lowest water. Height.	Date.	Mean stage.	Monthly range.
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,954	14	3.1	7	1.5	1	2.3	1.6
Reeds Landing, Minn.	1,884	12	1.5	1,3	0.7	20	1.1	0.8
La Crosse, Wis.	1,819	12	3.1	4,5	1.7	21,27	2.2	1.4
Prairie du Chien, Wis.	1,759	18	2.6	7,8	0.9	1	1.7	1.7
Dubuque, Iowa	1,699	15	3.1	8,9	1.6	1-3	2.4	1.5
Leclaire, Iowa	1,609	10	2.0	25	0.8	3-5	1.4	1.2
Davenport, Iowa	1,593	15	3.4	25,26	1.8	3-5	2.5	1.6
Muscatine, Iowa	1,562	16	4.3	26	2.3	4-6	3.1	2.0
Galland, Iowa	1,472	8	3.1	28	1.4	19-24	1.9	1.7
Keokuk, Iowa	1,463	15	5.7	28	2.2	23,24	3.8	3.5
Hannibal, Mo.	1,402	13	6.9	1,2	3.2	24,25	5.0	3.7
Grafton, Ill.	1,306	23	12.1	1	5.9	24	8.2	6.2
St. Louis, Mo.	1,264	30	20.2	1	7.5	24	13.9	12.7
Chester, Ill.	1,189	30	16.9	1	6.5	24,25	11.3	10.4
New Madrid, Mo.	1,003	34	16.4	2	6.9	27	11.6	9.5
Memphis, Tenn.	843	33	12.1	4	3.0	28,29	7.8	9.1
Helena, Ark.	767	42	18.0	5	6.3	30	13.0	11.7
Arkansas City, Ark.	635	42	19.6	7	7.0	30	14.7	12.6
Greenville, Miss.	595	42	15.6	7,8,12	6.1	30	12.1	9.5
Vicksburg, Miss.	474	45	16.8	9	5.8	30	13.1	11.0
New Orleans, La.	108	16	5.7	14	4.0	28,30	5.0	1.7
Yellowstone River.								
Glendive, Mont.	98	17	0.8	1,30	0.0	16,17	0.4	0.8
James River.								
Lamoure, N. Dak.	.....	25	0.6	1	—1.1	24-26,28-30	—0.6	1.7
Huron, S. Dak.	210	9	1.3	1,2	0.5	26,27,29,30	0.9	0.8
Missouri River.								
Townsend, Mont.	2,504	10	3.6	26-30	3.5	1-25	3.5	0.1
Fort Benton, Mont.	2,285	12	0.6	1-3	0.3	16,17	0.5	0.3
Buford, N. Dak.	.....	.....	.....	.....	.....	.....	.....	.....
Bismarck, N. Dak.	1,309	14	2.1	2,3	0.5	26-30	1.1	1.6
Pierre, S. Dak.	1,114	14	3.5	1	1.5	27-30	2.2	2.0
Sioux City, Iowa	784	19	8.0	2,3	6.1	30	6.9	1.9
Omaha, Nebr.	669	18	8.7	1	6.5	20,21	7.5	2.2
St. Joseph, Mo.	481	10	5.8	1	1.2	21,22	2.8	4.6
Kansas City, Mo.	388	21	17.0	2	6.8	21	10.2	10.2
Boonville, Mo.	199	20	15.0	3	7.4	22	10.6	7.6
Hermann, Mo.	103	24	16.0	4	6.3	23	11.0	9.7
Illinois River.								
Peoria, Ill.	135	14	11.8	30	8.6	23	9.8	3.2
Youghiogheny River.								
Confluence, Pa.	59	10	0.7	27,28	0.3	21-25	0.4	0.4
West Newton, Pa.	15	23	0.2	29,30	0.0	4-6,16-26	0.1	0.2
Allegheny River.								
Warren, Pa.	177	14	0.1	1-8	—0.3	21-30	—0.1	0.4
Oil City, Pa.	123	13	0.7	27	0.2	22-24	0.4	0.5
Parker, Pa.	73	20	1.0	29	—0.2	18-24	0.1	1.2
Monongahela River.								
Weston, W. Va.	161	18	—0.6	1-5	—1.2	19-24	—0.9	0.6
Fairmont, W. Va.	119	25	1.0	1-4,28-30	0.7	19-26	0.8	0.3
Greensboro, Pa.	81	18	6.8	30	6.0	19-21	6.3	0.8
Lock No. 4, Pa.	40	28	7.5	1,2	5.9	30	6.6	1.6
Conemaugh River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Johnstown, Pa.	64	7	0.9	1,2	0.4	21-24	0.6	0.5
Red Bank Creek.								
Brookville, Pa.	35	8	0.2	1-16	—0.5	20-30	—0.1	0.7
Beaver River.								
Elwood Junction, Pa.	10	14	2.4	1	2.1	7-29	2.1	0.3
Great Kanawha, River.								
Charleston, W. Va.	58	30	7.0	30	5.0	5	6.5	2.0
Little Kanawha River.								
Glenville, W. Va.	103	20	3.2	28	—2.8	23-25	—1.6	6.0
New River.								
Hinton, W. Va.	95	14	1.8	12	1.0	1-4	1.2	0.8
Cheat River.								
Rowlesburg, W. Va.	36	14	2.2	5	—0.4	25	1.0	2.6
Ohio River.								
Pittsburg, Pa.	966	22	6.5	29	5.4	18	5.8	1.1
Davis Island Dam, Pa.	960	25	2.6	29,30	1.7	20	2.1	0.9
Wheeling, W. Va.	875	36	2.6	30	1.1	22	1.9	1.5
Parkersburg, W. Va.	785	36	3.5	28	1.9	24-26	2.5	1.6
Point Pleasant, W. Va.	703	39	1.8	1,10	1.0	25,26	1.4	0.8
Huntington, W. Va.	660	50	4.1	1,2,4,5	3.3	22-26	3.7	0.8
Catlettsburg, Ky.	651	50	1.9	1,2	0.8	23,24,25	1.4	1.1
Portsmouth, Ohio	612	50	3.6	1	2.5	25,26	3.0	1.1
Cincinnati, Ohio.	499	50	5.7	1	3.9	24,25	4.4	1.8
Madison, Ind.	413	46	5.5	1	3.5	27	4.0	2.0
Louisville, Ky.	367	28	3.4	1	2.7	8,9	2.9	0.7
Evansville, Ind.	184	35	4.0	3,4	1.7	24	2.7	2.3
Paducah, Ky.	47	40	5.0	2	1.4	17,18,23-26	2.6	3.6
Cairo, Ill.	1,073	45	18.9	2	7.3	26	12.9	11.6
Muskingum River.								
Zanesville, Ohio	70	20	6.7	30	5.3	18-24	5.6	1.4
Scioto River.								
Columbus, Ohio.	110	17	2.9	30	2.1	8	2.3	0.8
Miami River.								
Dayton, Ohio	77	18	2.0	26	0.1	7-14, 17, 20-25	0.4	1.9
Wabash River.								
Mount Carmel, Ill.	50	15	3.8	30	1.0	25,26	1.6	2.8
Licking River.								
Falmouth, Ky.	30	25	0.6	26,27	0.1	4-13, 18-23	0.2	0.5
Kentucky River.								
Frankfort, Ky.	65	31	5.9	3	5.0	18-27	5.2	0.9
Clinch River.								
Speers Ferry, Va.	156	20	1.2	26	—0.8	2,16,17	—0.3	2.0
Clinton, Tenn.	52	25	7.4	28	2.4	11-14,18	3.2	5.0
Holston River.								
Rogersville, Tenn.	103	14	2.2	27	1.4	2-4,16-21, 23-25	1.6	0.8
French Broad River.								
Leadvale, Tenn.	70	15	.....	.....	.....	.....	.....	.....
Tennessee River.								
Knoxville, Tenn.	635	29	1.9	27	0.3	2	1.0	1.6
Kingston, Tenn.	556	25	2.5	29	1.0	1-11	1.4	1.5
Chattanooga, Tenn.	452	33	3.6	27-29	1.2	2,3	2.0	2.4

For continuation of Table VII see page 471.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of September, 1902.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	14	23	11	21	s. 48 w.	14
Portland, Me	19	21	17	19	s. 45 w.	3
Northfield, Vt	13	40	10	7	s. 6 e.	27
Boston, Mass	21	16	20	15	n. 45 e.	7
Nantucket, Mass	16	17	28	13	s. 86 e.	15
Block Island, R. I	17	21	26	16	s. 68 e.	11
New Haven, Conn	31	16	11	13	n. 8 w.	15
Middle Atlantic States.						
Albany, N. Y	21	25	10	13	s. 37 w.	5
Binghamton, N. Y.†	10	5	18	7	n. 66 e.	12
New York, N. Y	23	14	21	15	n. 34 e.	11
Harrisburg, Pa.†	17	11	28	16	n. 63 e.	13
Philadelphia, Pa	19	18	23	14	n. 84 e.	9
Scranton, Pa	22	16	23	12	n. 61 e.	12
Atlantic City, N. J	20	19	17	18	n. 45 w.	1
Cape May, N. J	23	17	21	12	n. 56 e.	11
Baltimore, Md	25	17	15	16	n. 7 w.	8
Washington, D. C	21	17	19	13	n. 56 e.	7
Lynchburg, Va	14	25	24	18	s. 29 e.	12
Norfolk, Va	23	24	18	4	s. 86 e.	14
Richmond, Va	21	22	18	7	s. 85 e.	11
South Atlantic States.						
Ashville, N. C	15	28	17	13	s. 17 e.	14
Charlotte, N. C	15	17	27	12	s. 82 e.	15
Hatteras, N. C	24	16	26	12	n. 60 e.	16
Kitty Hawk, N. C.†	12	9	11	7	n. 53 e.	5
Raleigh, N. C	26	16	20	13	n. 35 e.	12
Wilmington, N. C	22	14	26	14	n. 56 e.	14
Charleston, S. C	21	14	29	14	n. 65 e.	17
Columbia, S. C	20	17	31	9	n. 82 e.	22
Augusta, Ga	20	20	27	10	e.	17
Savannah, Ga	21	14	27	11	n. 66 e.	18
Jacksonville, Fla	21	17	23	13	n. 68 e.	11
Florida Peninsula.						
Jupiter, Fla	6	27	15	21	s. 16 w.	22
Key West, Fla	6	20	39	9	s. 65 e.	33
Tampa, Fla	22	13	30	10	n. 66 e.	22
Eastern Gulf States.						
Atlanta, Ga	9	22	29	11	s. 54 e.	22
Macon, Ga.†	13	7	9	4	n. 40 e.	8
Pensacola, Fla.†	12	8	15	5	n. 68 e.	11
Mobile, Ala	25	19	17	10	n. 49 e.	9
Montgomery, Ala	16	15	31	8	n. 88 e.	23
Meridian, Miss†	9	8	14	6	n. 83 e.	8
Vicksburg, Miss	20	15	27	9	n. 74 e.	19
New Orleans, La	19	22	27	8	s. 81 e.	19
Western Gulf States.						
Shreveport, La	19	18	27	12	n. 86 e.	15
Fort Smith, Ark	15	6	33	13	n. 66 e.	22
Little Rock, Ark	20	12	23	17	n. 37 e.	10
Corpus Christi, Tex	13	27	31	3	s. 63 e.	31
Fort Worth, Tex	18	22	24	9	s. 75 e.	16
Galveston, Tex	14	29	24	10	s. 43 e.	20
Palestine, Tex	25	18	25	6	n. 70 e.	20
San Antonio, Tex	23	15	32	3	n. 75 e.	30
Taylor, Tex †	15	11	2	3	n. 14 w.	4
Ohio Valley and Tennessee.						
Chattanooga, Tenn	21	17	23	13	n. 68 e.	11
Knoxville, Tenn	24	12	16	22	n. 27 w.	13
Memphis, Tenn	27	16	17	14	n. 15 e.	11
Nashville, Tenn	19	20	19	15	s. 76 e.	4
Lexington, Ky. †	2	18	10	6	s. 14 e.	16
Louisville, Ky	16	21	16	17	s. 11 w.	5
Evansville, Ind.†	8	11	12	6	s. 63 e.	7
Indianapolis, Ind	15	32	10	16	s. 19 w.	18
Cincinnati, Ohio	12	17	23	22	s. 11 e.	5
Columbus, Ohio	11	26	19	19	s.	15
Pittsburg, Pa	18	26	15	19	s. 27 w.	9
Parkersburg, W. Va	12	22	22	15	s. 35 e.	12
Elkins, W. Va	21	17	11	20	n. 66 w.	10
Lower Lake Region.						
Buffalo, N. Y	10	24	16	22	s. 23 w.	15
Oswego, N. Y	6	35	17	12	s. 10 e.	29
Rochester, N. Y	8	33	14	22	s. 18 w.	26
Syracuse, N. Y	8	29	16	14	s. 5 e.	21
Erie, Pa	13	26	11	21	s. 38 w.	16
Cleveland, Ohio	14	30	23	13	s. 32 e.	19
Sandusky, Ohio †	5	16	5	12	s. 32 w.	13
Toledo, Ohio	13	26	13	22	s. 35 w.	16
Detroit, Mich	15	24	14	17	s. 18 w.	10
Upper Lake Region.						
Alpena, Mich	16	17	17	24	s. 82 w.	7
Escanaba, Mich	19	25	9	20	s. 61 w.	12
Grand Haven, Mich	20	20	17	20	w.	3
Houghton, Mich.†	6	9	7	15	s. 69 w.	8
Marquette, Mich	13	26	8	27	s. 56 w.	23
Port Huron, Mich	16	24	15	18	s. 21 w.	8
Sault Ste. Marie, Mich	10	22	24	20	s. 18 e.	13
Chicago, Ill	17	21	15	17	s. 27 w.	4
Milwaukee, Wis	18	20	11	24	s. 81 w.	13
Green Bay, Wis	15	29	14	20	s. 23 w.	15
Duluth, Minn	32	5	17	24	n. 15 w.	28
North Dakota.						
Moorhead, Minn	24	16	19	22	n. 21 w.	8
Bismarck, N. Dak	16	13	12	24	n. 76 w.	12
Williston, N. Dak	26	17	6	20	n. 57 w.	17
Upper Mississippi Valley.						
St. Paul, Minn	16	24	12	22	s. 51 w.	13
La Crosse, Wis. †	9	16	3	5	s. 16 w.	7
Davenport, Iowa	13	21	18	22	s. 27 w.	9
Des Moines, Iowa	16	21	15	22	s. 54 w.	9
Dubuque, Iowa	15	24	18	18	s.	9
Keokuk, Iowa	15	24	14	21	s. 38 w.	11
Cairo, Ill	19	18	19	16	n. 72 e.	3
Springfield, Ill	17	23	10	22	s. 63 w.	13
Hannibal, Mo. †	9	11	6	12	s. 72 w.	6
St. Louis, Mo	16	26	11	15	s. 22 w.	11
Missouri Valley.						
Columbia, Mo. *	8	14	9	4	s. 40 e.	8
Kansas City, Mo	17	26	15	17	s. 13 w.	9
Springfield, Mo	16	25	23	13	s. 48 e.	14
Lincoln, Nebr	24	21	16	11	n. 59 e.	6
Omaha, Nebr	21	26	13	14	s. 11 w.	5
Valentine, Nebr	23	18	11	23	n. 67 w.	13
Sioux City, Iowa †	10	12	6	8	s. 45 w.	3
Pierre, S. Dak	21	21	19	16	e.	3
Huron, S. Dak	24	18	19	17	n. 18 e.	6
Yankton, S. Dak. †	10	10	6	13	w.	7
Northern Slope.						
Havre, Mont	20	14	8	35	n. 78 w.	28
Miles City, Mont	13	28	6	25	s. 52 w.	24
Helena, Mont	11	18	10	34	s. 74 w.	25
Kalispell, Mont	10	15	10	37	s. 80 w.	28
Rapid City, S. Dak	21	11	11	27	n. 58 w.	19
Cheyenne, Wyo	25	20	7	22	n. 72 w.	16
Lander, Wyo	21	17	12	21	n. 66 w.	10
North Platte, Nebr	22	18	13	21	n. 63 w.	9
Middle Slope.						
Denver, Colo	21	24	16	11	s. 59 e.	6
Pueblo, Colo	22	15	26	12	n. 63 e.	16
Concordia, Kans	16	29	11	10	s. 4 e.	13
Dodge, Kans	20	22	24	11	s. 56 e.	4
Wichita, Kans	19	30	15	7	s. 36 e.	14
Oklahoma, Okla	19	25	19	8	s. 61 e.	12
Southern Slope.						
Abilene, Texas	23	24	23	6	s. 87 e.	17
Amarillo, Tex	17	28	19	11	s. 36 e.	14
Southern Plateau.						
El Paso, Texas	18	9	32	14	n. 63 e.	20
Santa Fe, N. Mex	11	29	20	14	s. 18 e.	19
Flagstaff, Ariz	16	11	16	27	n. 66 w.	12
Phoenix, Ariz	11	15	25	19	s. 56 e.	7
Yuma, Ariz	14	22	13	23	s. 51 w.	13
Independence, Cal	22	17	13	26	n. 69 w.	14
Middle Plateau.						
Carson City, Nev	14	18	9	28	s. 78 w.	19
Winnemucca, Nev	26	8	14	27	n. 36 w.	22
Modena, Utah	10	17	12	21	s. 52 w.	11
Salt Lake City, Utah	23	14	20	19	n. 6 e.	9
Grand Junction, Colo	18	16	19	22	n. 56 w.	4
Northern Plateau.						
Baker City, Oreg	23	25	14	13	s. 27 e.	2
Boise, Idaho	18	18	17	23	w.	6
Lewiston, Idaho †	1	5	19	6	s. 73 e.	14
Pocatello, Idaho	10	20	18	25	s. 35 w.	12
Spokane, Wash	13	21	19	19	s.	8
Walla Walla, Wash	15	33	5	13	s. 18 w.	19
North Pacific Coast Region.						
Neah Bay, Wash	4	13	20	33	s. 55 w.	16
North Head, Wash	35	10	11	17	n. 13 w.	26
Port Crescent, Wash. *	1	1	11	18	w.	7
Seattle, Wash	26	12	21	15	n. 23 e.	15
Tacoma, Wash	31	15	9	14	n. 17 w.	17
Astoria, Oreg	17	13	13	30	n. 77 w.	18
Portland, Oreg	29	12	6	31	n. 74 w.	26
Roseburg, Oreg	33	8	9	14	n. 11 w.	26
Middle Pacific Coast Region.						
Eureka, Cal	28	14	8	25	n. 51 w.	22
Mount Tamalpais, Cal	29	7	4	36	n. 56 w.	39
Red Bluff, Cal	29	20	20	9	n. 51 e.	14
Sacramento, Cal	10	38	18	8	s. 20 e.	30
San Francisco, Cal	1	13	3	49	s. 75 w.	48
South Pacific Coast Region.						
Fresno, Cal	25	3	1	44	n. 63 w.	48
Los Angeles, Cal	7	6	9	41	n. 88 w.	32
San Diego, Cal	25	9	1	37	n. 66 w.	39
San Luis Obispo, Cal	19	11	1	31	n. 75 w.	31
West Indies.						
Basseterre St. Kitts, W. I	13	2	53	0	n. 79 e.	54
Bridgetown, Barbados	9	7	52	0	n. 88 e.	52
Cienfuegos, Cuba	22	5	45	1	n. 69 e.	47
Colon, Columbia, S. A	7	17	8	7	s. 6 e.	10
Grand Turk, Turks Island †	0	11	25	0	s. 66 e.	27
Havana, Cuba	6	12	50	0	s. 83 e.	50
Kingston, Jamaica	49	0	20	1	n. 21 e.	53
Port of Spain, Trinidad, W. I †	0	10	21	3	s. 61 e.	21
Puerto Principe, Cuba	18	7	43	2	n. 75 e.	42
Roseau, Dominica, W. I †	10	8	11	13	n. 45 w.	3
San Juan, Porto Rico	2	23	46	1	s. 65 e.	50
Santiago de Cuba, Cuba	39	7	16	6	n. 17 e.	34
Santo Domingo, S. Dom., W. I	54	3	9	0	n. 10 e.	52
Willemstad	6	4	57	0	n. 88 e.	57

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, September, 1902.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	....	3	4	1	....	....	....	2	....	1	1	1	....	1	....	....	....	3	....	....	....	....	....	3	2	2	3	....	3	1	....	31	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	56	T.	....	....	2	8	....	1	8	....	2	7	4	7	2	3	10	1	....	1	2	3	1	....	....	....	....	1	1	1	....	....	....	65	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	57	T.	13	1	1	....	2	4	....	....	....	....	9	8	....	....	....	....	7	1	....	....	....	5	6	1	....	2	4	....	2	2	....	68	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	167	T.	....	....	....	....	....	....	1	2	1	1	2	6	3	1	....	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	20	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	81	T.	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	3	2	6	5	8	11	6	....	....	2	4	....	....	2	....	....	52	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	21	T.	....	....	....	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3	....	....	....	....	....	2	....	11	1	....	....	29	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Delaware	5	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	....	....	1	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	47	T.	6	5	6	9	11	11	9	11	10	9	10	9	6	4	3	8	5	4	6	4	3	6	12	15	11	13	2	4	1	2	1	216	31	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	55	T.	....	....	1	3	....	....	4	4	2	....	1	2	....	....	....	....	....	....	....	....	1	....	....	16	8	2	8	....	4	8	....	64	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	34	T.	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	5	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Illinois	92	T.	2	....	1	....	13	6	1	24	10	1	1	....	....	....	....	....	19	6	....	....	....	2	8	16	4	1	8	....	1	8	....	132	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Indiana	58	T.	8	....	....	....	....	....	....	6	3	....	1	1	....	....	....	....	1	1	1	....	....	1	5	11	7	....	10	....	....	21	....	77	14	T.
		A.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2	2	A.
Indian Territory	11	T.	3	....	1	....	1	5	....	....	....	....	....	1	....	....	....	....	3	....	....	1	2	2	....	....	....	1	2	....	4	....	1	27	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	149	T.	1	2	7	1	30	3	....	11	....	....	....	1	1	....	....	3	11	....	....	7	....	3	....	2	....	11	16	1	2	2	....	115	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kansas	77	T.	4	....	....	....	19	....	....	....	....	1	8	....	....	....	....	6	6	....	....	5	16	20	12	2	....	6	....	1	19	....	....	125	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	41	T.	4	....	....	....	....	....	....	....	4	....	....	1	....	....	....	....	....	....	....	....	1	....	1	2	3	2	1	....	....	2	....	21	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	46	T.	5	6	6	3	....	....	....	1	1	....	1	9	1	....	....	3	9	1	....	....	....	4	8	6	3	4	4	5	5	3	....	88	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	19	T.	4	3	....	3	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	15	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maryland	48	T.	....	1	9	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	1	....	....	....	7	2	4	....	....	....	....	....	27	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Massachusetts	48	T.	....	....	....	5	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	10	1	....	....	19	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Michigan	106	T.	4	2	16	1	....	18	5	4	7	1	....	....	....	....	....	....	4	....	....	....	1	4	....	....	2	1	13	2	....	....	....	85	16	T.
		A.	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Minnesota	67	T.	....	6	2	....	9	....	3	2	1	1	1	1	1	....	....	2	2	1	7	9	1	....	....	....	1	6	3	....	1	....	....	60	20	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Mississippi	44	T.	6	11	1	....	....	....	....	....	....	....	2	6	....	....	....	1	6	....	....	1	....	1	8	3	....	....	3	3	3	4	....	59	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	95	T.	5	....	1	....	27	14	....	10	1	....	1	....	....	....	....	....	18	....	....	....	5	11	18	10	....	18	5	....	20	7	....	171	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Montana	40	T.	....	....	....	1	....	....	1	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nebraska	142	T.	....	13	1	....	16	....	....	1	....	....	....	1	....	....	....	8	5	....	4	11	7	5	1	....	3	3	....	....	5	1	....	85	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nevada	40	T.	....	....	....	....	....	....	....	....	....	1	....	....	5	6	2	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	15	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	19	T.	4	1	....	8	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	15	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Jersey	51	T.	....	1	....	10	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	21	....	....	....	38	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	A.
New Mexico	31	T.	4	1	....	....	....	....	2	....	....	....	....	....	....	1	....	....	....	3	....	2	....	....	....	....	....	....	....	....	4	....	....	17	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	99	T.	7	2	1	12	....	2	5	1	9	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	36	2	....	....	78	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Carolina	56	T.	....	8	8	2	....	....	....	6	7	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	7	8	6	....	....	8	....	62	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	48	T.	....	....	....	....	1	....	3	....	....	....	....	....	....	....	....	3	....	....	2	1	....	....	....	....	....	....	1	....	....	....	....	11	6	T.
		A.	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	A.
Ohio	128	T.	19	1	....	1	....	9	....	....	33	....	....	....	2	....	....	....	....	....	3	....	....	....	....	1	20	8	11	....	....	15	....	123	12	T.
		A.	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Oklahoma	23	T.	3	....	....	....	3	....	....	....	....	....	3	....	....	....	....	....	3	....	....	2	3	3	....	1	....	4	....	....	1	....	....	26	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	74	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	....	....	....	....	3	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	91	T.	....	....	2	1	....	4	....	....	9	....	....	....	....	....	....	....	....	....	....	5	....	....	....	1	1	1	1	10	....	....	....	35	10	T.
		A.	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	7	T.	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	2	....	....	10	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	46	T.	....	....	1	6	1	1	4	12	6	....	....	1	....	....	....	....	1	....	....	....	....	....	....	7	5	5	10	4	....	10	....	74	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	56	T.	1	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	5	5	1	....	....	....	1	....	....	....	....	....	....	15	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	A.
Tennessee	56	T.	4	2	2	1	....	....	....	3	1	....	....	1	....	....	....	....	....	2	....	....	....	....	....	9	7	4	2	....	....	1	....	39	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Texas	95	T.	16	7	18	14	4	16	1	....	....	....	5	7	....	....	....	1	15	6	2	1	4	17	11	2	2	10	7	4	14	2	1	187	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	47	T.	....	....	....	1	....	....	....	....	....	....	....	....	....	1	9	2	....	7	2	5	1	1	....	....	....	....	....	....	....	....	....	29	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	16	T.	3	1	....	3	....	....	3	....	....	....	....	1	....	....	....	....	1	1	1	....	....	2	....	....	....	....	....	....	....	....	....	16	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Virginia	50	T.	1	8	7	2	....	....	....	....	4	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2	3	17	1	....	....	....	....	46	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	64	T.	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	2	....	....	1	....	....	....	....	6	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
West Virginia	43	T.	2	1	3	....	....	2	1	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	4	10	9	....	....	....	1	....	....	38	10	T.
		A.	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	3	2	A.
Wisconsin	60	T.	....	1	4	....	21	6	5	21	1	....	....	....	....	....	....	1	11	1	....	....	1	....	1	....	....	1	11	....	....	....	....	86	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wyoming	31	T.	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	1	3	1	....	....	....	....	2	....	....	....	....	....	....	8	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,893	T.	131	88	106	112	160	103	61	122	125	24	50	64	22	17	28	44	130	46	46	77	60	93	91	130	106	151	136	122	95	98	3	2,641	....	T.
		A.	1	0	1	0	1	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	3	1	0	0	13	....	A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during September, 1902, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	28			0.98														0.39			
Alpena, Mich.	30			0.74														0.64			
Atlanta, Ga.	3	1:28 p. m.	4:30 p. m.	0.91	1:37 p. m.	1:55 p. m.	T.	0.19	0.48	0.69	0.75	0.76	0.79								
Do	27	3:43 p. m.	5:45 p. m.	0.97	3:43 p. m.	4:00 p. m.	0.00	0.59	0.77	0.88	0.92	0.93									
Atlantic City, N. J.	3–4			1.31														0.67			
Augusta, Ga.	30			0.86														*			
Baltimore, Md.	24			0.99														0.65			
Binghamton, N. Y.	28–29			1.38														0.51			
Bismarck, N. Dak.	16–17			0.28														0.10			
Boise, Idaho.	19			0.03														0.02			
Boston, Mass.	4			0.59														0.52			
Buffalo, N. Y.	9			0.41														0.31			
Cairo, Ill.	1	2:50 p. m.	6:40 p. m.	0.81	3:05 p. m.	3:35 p. m.	0.04	0.10	0.21	0.33	0.44	0.51	0.56	0.59							
Charleston, S. C.	8	8:36 a. m.	9:44 a. m.	0.79	8:53 p. m.	9:20 a. m.	0.04	0.18	0.53	0.57	0.59	0.73	0.75								
Do	27	10:13 p. m.	11:35 p. m.	0.67	10:15 p. m.	10:50 p. m.	T.	0.10	0.21	0.35	0.51	0.55	0.60	0.66							
Charlotte, N. C.	8–9			1.62														0.63			
Chattanooga, Tenn.	24	11:52 a. m.	5:52 p. m.	1.45	11:53 a. m.	11:59 a. m.	T.	0.42	0.50	0.51											
Chicago, Ill.	23–24			1.53														0.32			
Cincinnati, Ohio.	1	D. N.	8:30 a. m.	1.04	6:40 a. m.	7:05 a. m.	0.17	0.08	0.33	0.46	0.54	0.62	0.65	0.67							
Cleveland, Ohio.	9			0.84														0.42			
Columbia, Mo.	5–6			1.03														0.52			
Columbia, S. C.	8	2:42 p. m.	6:20 p. m.	1.43	2:47 p. m.	4:10 p. m.	T.	0.20	0.28	0.30	0.35	0.57	0.65	0.71	0.73	0.74	0.80	0.96	1.23		
Columbus, Ohio.	18–19			1.19														0.58			
Corpus Christi, Tex.	23	8:50 a. m.	3:30 p. m.	2.49	8:59 a. m.	10:10 a. m.	0.03	0.21	0.56	0.80	0.94	1.07	1.28	1.36	1.42	1.50	1.58	1.70	1.88	2.13	
Davenport, Iowa.	22–23			0.84														0.50			
Denver, Colo.	20–21	7:54 p. m.	6:20 p. m.	2.70	8:05 p. m.	8:25 p. m.	0.04	0.30	0.60	0.90	1.20										
Des Moines, Iowa.	29–30			1.96														0.50			
Detroit, Mich.	25–26			0.36														0.29			
Dodge, Kans.	22–23			0.46														0.28			
Dubuque, Iowa.	5–6			1.21														0.39			
Duluth, Minn.	20–21			0.74														0.10			
Eastport, Me.	10			1.33														0.61			
Elkins, W. Va.	26	4:06 p. m.	6:05 p. m.	1.36	4:06 p. m.	5:00 p. m.	0.00	0.11	0.25	0.49	0.57	0.61	0.67	0.89	1.08	1.10	1.24	1.29			
Erie, Pa.	9			0.90														0.54			
Escanaba, Mich.	5–6			1.05														0.28			
Evansville, Ind.	24			0.49														0.46			
Fort Smith, Ark.	29	7:47 p. m.	9:06 p. m.	0.66	8:00 p. m.	8:15 p. m.	0.06	0.22	0.44	0.51	0.54	0.56	0.58								
Fort Worth, Tex.	22	9:30 a. m.	11:05 a. m.	1.05	9:55 a. m.	10:45 a. m.	0.08	0.16	0.27	0.40	0.44	0.50	0.56	0.74	0.79	0.87	0.95				
Galveston, Tex.	17–18	11:20 p. m.	1:30 a. m.	0.95	11:35 p. m.	12:10 a. m.	0.06	0.10	0.20	0.35	0.55	0.67	0.70	0.75	0.76						
Do	27	12:05 a. m.	7:40 a. m.	1.10	12:10 a. m.	12:35 a. m.	T.	0.18	0.40	0.59	0.67	0.72	0.76	0.78	0.80						
Do	30	5:50 a. m.	9:00 a. m.	1.31	5:55 a. m.	6:57 a. m.	T.	0.10	0.24	0.38	0.56	0.59	0.63	0.67	0.71	0.82	0.88	1.05			
Grand Haven, Mich.	23–24			2.22														0.66			
Grand Junction, Colo.	20–21			0.84														0.14			
Green Bay, Wis.	27			0.52														0.44			
Harrisburg, Pa.	24–26			3.21														0.40			
Hatteras, N. C.	13	5:16 p. m.	7:20 p. m.	0.81	5:25 p. m.	6:15 p. m.	0.03	0.09	0.14	0.19	0.27	0.33	0.41	0.50	0.57	0.66	0.74	0.77			
Huron, S. Dak.	26			0.15														0.05			
Indianapolis, Ind.	30	2:55 p. m.	3:45 p. m.	1.10	3:23 p. m.	3:35 p. m.	T.	0.39	1.08	1.09	1.10										
Jacksonville, Fla.	6	3:12 p. m.	8:29 p. m.	1.02	3:17 p. m.	3:45 p. m.	T.	0.08	0.21	0.37	0.50	0.57	0.62	0.65	0.67	0.71	0.75				
Do	13	2:55 p. m.	4:30 p. m.	1.19	3:02 p. m.	3:40 p. m.	T.	0.05	0.15	0.27	0.47	0.92	1.10	1.17	1.18						
Do	19	8:50 a. m.	4:45 p. m.	2.14	10:12 a. m.	11:30 a. m.	0.43	0.15	0.34	0.42	0.50	0.60	0.69	0.78	0.92	1.07	1.11	1.32	1.53		
Do	25	3:30 p. m.	7:10 p. m.	1.09	4:17 p. m.	4:34 p. m.	T.	0.16	0.33	0.49	0.51										
Jupiter, Fla.	10	11:58 a. m.	12:30 p. m.	0.62	12:06 p. m.	12:16 p. m.	0.03	0.33	0.57	0.58											
Do	16–17	7:37 p. m.	1:30 a. m.	1.62	10:00 p. m.	10:55 p. m.	0.29	0.08	0.30	0.45	0.53	0.57	0.58	0.61	0.75	0.90	1.05	1.21			
Do	21	12:55 p. m.	1:30 p. m.	0.90	1:03 p. m.	1:22 p. m.	0.02	0.28	0.67	0.81	0.88										
Kalispell, Mont.	16			0.18														0.15			
Kansas City, Mo.	22	5:30 a. m.	1:20 p. m.	2.28	5:45 a. m.	6:35 a. m.	0.06	0.06	0.18	0.31	0.41	0.53	0.63	0.70	0.76	0.86	0.91	0.95			
Do	29	1:20 p. m.	9:00 p. m.	0.97	7:48 p. m.	8:10 p. m.	0.35	0.09	0.29	0.36	0.52	0.57									
Key West, Fla.	20	1:30 p. m.	2:40 p. m.	0.77	1:30 p. m.	1:50 p. m.	0.00	0.06	0.42	0.70	0.75										
Knoxville, Tenn.	8	5:05 p. m.	7:30 p. m.	0.81	5:27 p. m.	6:05 p. m.	0.05	0.13	0.19	0.21	0.30	0.38	0.50	0.64	0.74						
Do	30	12:01 p. m.	2:40 p. m.	0.98	1:15 p. m.	1:50 p. m.	0.13	0.04	0.08	0.28	0.44	0.56	0.73	0.79	0.81						
La Crosse, Wis.	27			0.72														0.35			
Lewiston, Idaho.	19			0.21														0.12			
Lexington, Ky.	24			0.68														0.34			
Lincoln, Nebr.	22–23			2.67														0.42			
Little Rock, Ark.	1	1:55 p. m.	4:20 p. m.	0.97	2:05 p. m.	2:30 p. m.	0.05	0.23	0.34	0.48	0.60	0.67	0.69	0.71	0.73						
Do	22–23	10:25 p. m.	11:15 a. m.	1.65	10:35 p. m.	12:20 a. m.	0.02	0.12	0.27	0.36	0.41	0.51	0.59	0.68	0.70	0.72	0.73	0.81	0.99	1.17	
Los Angeles, Cal.	20			T.																	
Louisville, Ky.	30	9:22 a. m.	12:50 p. m.	1.14	9:27 a. m.	9:50 a. m.	0.01	0.35	0.46	0.65	0.85	0.90	0.93								
Lynchburg, Va.	30			0.54														0.41			
Macon, Ga.	29	4:30 p. m.	6:10 p. m.	0.61	4:50 p. m.	5:20 p. m.	T.	0.06	0.13	0.27	0.42	0.47	0.52	0.56	0.58						
Do	30	5:10 p. m.	6:15 p. m.	0.65	5:13 p. m.	5:24 p. m.	T.	0.43	0.63	0.64											
Memphis, Tenn.	17–18			0.88														0.41			
Meridian, Miss.	2	1:45 p. m.	2:50 p. m.	0.69	2:20 p. m.	2:40 p. m.	0.03	0.13	0.27	0.42	0.64	0.66	0.68								
Do	3	D. N.	1:00 p. m.	2.33	12:05 p. m.	12:40 p. m.	1.22	0.04	0.16	0.41	0.68	0.83	1.04	1.08							
Do	23	3:54 p. m.	4:32 p. m.	1.12	4:07 p. m.	4:30 p. m.	0.02	0.13	0.38	0.60	0.99	1.10									
Do	27	10:15 a. m.	12:05 p. m.	0.86	10:25 a. m.	10:45 a. m.	T.	0.15	0.37	0.60	0.67	0.69									
Milwaukee, Wis.	27			1.26														0.51			
Montgomery, Ala.	2	4:28 p. m.	7:20 p. m.	0.53	4:58 p. m.	5:17 p. m.	T.	0.10	0.25	0.35	0.40										
Do	7	7:50 p. m.	8:18 p. m.	0.56	7:50 p. m.	8:05 p. m.	0.00	0.12	0.41	0.53	0.55	0.56									
Do	24	1:12 p. m.	3:30 p. m.	0.77	1:18 p. m.	1:28 p. m.	0.02	0.20	0.45	0.47	0.49	0.50									
Nantucket, Mass.	4			0.84														0.38			
Nashville, Tenn.	23–24			0.95														0.46			
New Haven, Conn.	9	12:03 p. m.	11:45 p. m.	1.96	4:05 p. m.	5:03 p. m.	0.58	0.05	0.14	0.19	0.25	0.32	0.36	0.37	0.40	0.63	0.83	1.03			
New Orleans, La.	3	1:20 p. m.	2:30 p. m.	0.87	1:20 p. m.	1:40 p. m.	0.00	0.15	0.32	0.75	0.82	0.85									
Do	22	12:16 p. m.	2:15 p. m.	1.12	12:36 p. m.	1:40 p. m.	T.	0.10	0.17	0.26	0.29	0.40	0.52	0.54	0.57	0.59	0.66	1.02	1.12		
Do	24	8:20 a. m.	11:50 a. m.	1.99	8:35 a. m. 10:05 a. m.	9:05 a. m. 10:35 a. m.	0.01 1.16	0.11 0.12	0.22 0.27	0.28 0.36	0.51 0.53	0.62 0.70	0.72 0.76	0.75	0.77	0.81					
New York, N. Y.	28			0.29														0.26			
Norfolk, Va.	2	7:42 p. m.	9:25 p. m.	0.86	8:23 p. m.	8:37 p. m.	0.03	0.34	0.70	0.82											
Northfield, Vt.	9–10			1.03														0.20			
Oklahoma, Okla.	21	7:40 a. m.	8:45 a. m.	0.56	8:19 a. m.	8:35 a. m.	0.01	0.15	0.32	0.53	0.55										
Omaha, Nebr.	26–27			0.23														0.14			
Palestine, Tex.	17	4:06 p. m.	5:45 p. m.	0.83	4:22 p. m.	5:10 p. m.	0.01	0.14	0.19	0.25	0.36	0.47	0.55	0.63	0.72	0.76	0.80				
Do	22–23	11:07 p. m.	D. N.	1.80	11:20 p. m.	11:45 p. m.	0.03	0.39	0.76	1.04	1.23	1.33	1.34								
Do	29	9:20 p. m.	11:45 p. m.	0.74	9:40 p. m.	10:05 p. m.	0.01	0.04	0.23	0.43	0.56	0.63	0.66	0.67							
Parkersburg, W. Va.	30			0.47														0.23			
Pensacola, Fla.	4	12:30 a. m.	1:26 a. m.	0.67	12:40 a. m.	12:55 a. m.	0.02	0.21	0.52	0.60	0.62										
Do	8–9	10:55 p. m.	D. N.	0.99	11:09 p. m.	11:35 p. m.	0.01	0.13	0.37	0.61	0.82	0.91	0.93								
Do	26	1:21 p. m.	1:59 p. m.	0.86	1:31 p. m.	1:55 p. m.	0.02	0.08	0.19	0.49	0.72	0.83									
Philadelphia, Pa.	25–26			2.74														0.38			
Pittsburg, Pa.	26			0.41														0.40			
Pocatello, Idaho.	28			0.17														0.05			

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Portland, Me.	29	1:20 p. m.	7:00 p. m.	2.08	3:00 p. m.	3:35 p. m.	0.11	0.12	0.24	0.49	0.84	1.13	1.30	1.37	1.39	.....	.....	.....	.....	.....	.....
Portland, Oreg	26-27	.....	.....	0.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.28	.....	.....	.....
Pueblo, Colo	29	.....	.....	0.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.20	.....	.....	.....
Raleigh, N. C	30	6:55 p. m.	10:00 p. m.	0.96	8:30 p. m.	9:00 p. m.	0.09	0.28	0.52	0.59	0.63	0.74	0.84	.....	.....	.....	.....	.....	.....	.....	.....
Richmond, Va	3-4	7:16 p. m.	D. N.	1.61	9:30 p. m.	10:25 p. m.	0.36	0.18	0.29	0.52	0.65	0.74	0.83	0.93	1.02	1.05	1.16	1.25	.....	.....	.....
Rochester, N. Y.	23-24	.....	.....	0.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.34	.....	.....	.....
St. Louis, Mo	17-18	.....	.....	0.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....
St. Paul, Minn	26	.....	.....	0.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.36	.....	.....	.....
Salt Lake City, Utah	19-20	.....	.....	0.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.02	.....	.....	.....
San Diego, Cal	7	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sandusky, Ohio	23-24	.....	.....	1.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....
San Francisco, Cal	18	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savannah, Ga	9	3:58 p. m.	6:15 p:m.	1.09	4:20 p. m.	4:45 p. m.	0.03	0.05	0.19	0.41	0.65	0.85	0.88	0.90	.....	.....	.....	.....	.....	.....	.....
Scranton, Pa	24-25	.....	.....	1.67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.45	.....	.....	.....
Seattle, Wash	18-19	.....	.....	0.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.23	.....	.....	.....
Shreveport, La	1	6:55 p. m.	11:30 p. m.	1.16	6:55 p. m.	7:30 p. m.	0.00	0.10	0.39	0.58	0.72	0.80	0.90	0.95	0.97	.....	.....	.....	.....	.....	.....
Spokane, Wash	26-27	.....	.....	0.32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.08	.....	.....	.....
Springfield, Ill	8	.....	.....	0.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....
Springfield, Mo	21	.....	.....	0.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.27	.....	.....	.....
Tampa, Fla	11	1:45 p. m.	3:30 p. m.	2.36	1:56 p. m.	3:00 p. m.	T.	0.13	0.35	0.73	1.05	1.27	1.50	1.72	1.77	1.91	2.05	2.27	2.35	.....	.....
Do	11	5:17 p. m.	8:20 p. m.	1.11	5:17 p. m.	6:00 p. m.	0.00	0.05	0.19	0.31	0.47	0.60	0.66	0.75	0.83	0.86	0.87	.....	.....	.....	.....
Do	16	3:55 p. m.	7:30 p. m.	1.42	4:00 p. m.	4:45 p. m.	0.01	0.15	0.37	0.52	0.68	0.87	1.01	1.08	1.16	1.25	1.28	1.32	.....	.....	.....
Do	17	5:45 p. m.	7:00 p. m.	0.86	5:49 p. m.	6:20 p. m.	T.	0.18	0.49	0.67	0.73	0.79	0.83	0.84	.....	.....	.....	.....	.....	.....	.....
Taylor, Tex.	4	5:51 p. m.	10:32 p. m.	3.55	5:53 p. m.	7:17 p. m.	T.	0.23	0.44	0.74	0.83	1.13	1.35	1.51	1.90	2.18	2.47	2.97	3.40	3.54	.....
Do	6	8:55 a. m.	12:20 p. m.	1.00	9:27 a. m.	10:05 a. m.	0.02	0.14	0.28	0.40	0.55	0.71	0.84	0.91	0.94	0.95	.....	.....	.....	.....	.....
Do	17	9:44 p. m.	11:20 p. m.	1.49	9:56 p. m.	10:40 p. m.	T.	0.07	0.17	0.29	0.49	0.69	0.90	1.17	1.38	1.48	1.49	.....	.....	.....	.....
Toledo, Ohio	23-25	.....	.....	2.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.58	.....	.....	.....
Topeka, Kan	5	4:53 p. m.	5:47 p. m.	0.78	4:53 p. m.	5:15 p. m.	0.00	0.07	0.22	0.59	0.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	22	9:10 p. m.	11:50 p. m.	1.28	9:16 p. m.	9:50 p. m.	T.	0.10	0.12	0.13	0.38	0.83	0.90	0.96	0.99	1.01	1.02	.....	.....	.....	.....
Valentine, Nebr	26	.....	.....	0.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.10	.....	.....	.....
Vicksburg, Miss	2	10:37 a. m.	2:03 p. m.	1.22	12:12 p. m.	12:55 p. m.	0.13	0.10	0.21	0.27	0.41	0.55	0.67	0.84	0.98	1.01	1.03	.....	.....	.....	.....
Do	23	8:15 a. m.	10:30 a. m.	1.41	8:34 a. m.	9:05 a. m.	0.01	0.06	0.21	0.35	0.56	0.83	1.14	1.17	1.20	.....	.....	.....	.....	.....	.....
Do	24	5:40 p. m.	6:25 p. m.	0.49	6:06 p. m.	6:18 p. m.	0.04	0.16	0.42	0.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington, D. C	9	.....	.....	1.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.61	.....	.....	.....
Wilmington, N. C	9-10	.....	.....	0.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.59	.....	.....	.....
Yankton, S. Dak	20	12:15 a. m.	10:20 a. m.	2.48	1:10 a. m.	2:00 a. m.	0.10	0.06	0.17	0.21	0.22	0.40	0.45	0.71	0.95	0.98	1.03	1.05	.....	.....	.....
Do	20	11:50 a. m.	5:50 p. m.	3.80	3:20 p. m.	4:10 p. m.	1.66	0.17	0.47	0.64	0.76	0.91	1.04	1.21	1.34	1.53	1.59	1.70	1.88	1.98	.....
Basseterre, St. Kitts	27	7:27 a. m.	7:59 a. m.	0.72	7:29 a. m.	7:50 a. m.	T.	0.34	0.54	0.66	0.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bridgetown, Barbados	18	.....	.....	0.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.35	.....	.....	.....
Cienfuegos, Cuba	2	6:20 p. m.	8:25 p. m.	2.39	6:35 p. m. 7:12 p. m.	6:50 p. m. 8:02 p. m.	T. 0.53	0.10 0.14	0.39 0.21	0.51 0.37	0.52 0.73	1.14	1.28	1.46	1.62	1.66	1.72	1.85	.....	.....	.....
Havana, Cuba	5	1:23 p. m.	4:40 p. m.	2.44	1:26 p. m.	2:25 p. m.	T.	0.07	0.13	0.31	0.51	0.85	1.22	1.65	1.85	2.01	2.14	2.29	2.35	.....	.....
Do	18	2:16 p. m.	6:40 p. m.	1.01	4:15 p. m.	4:50 p. m.	0.24	0.10	0.18	0.27	0.39	0.48	0.52	0.57	0.61	0.64	0.68	0.73	0.75	.....	.....
Kingston, Jamaica	1	2:35 p. m.	3:48 p. m.	0.80	2:39 p. m.	3:05 p. m.	T.	0.18	0.43	0.54	0.60	0.71	0.76	.....	.....	.....	.....	.....	.....	.....	.....
Puerto Principe, Cuba	13	6:10 p. m.	7:26 p. m.	0.79	6:25 p. m.	6:45 p. m.	0.11	0.18	0.38	0.61	0.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan, Porto Rico	16	.....	.....	0.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.50	.....	.....	.....
Santiago de Cuba, Cuba	2	9:55 a. m.	12:20 p. m.	2.83	11:15 a. m.	12:17 p. m.	0.54	0.38	0.62	0.84	1.09	1.26	1.37	1.56	1.80	2.08	2.19	2.22	2.29	.....	.....
Do	29	10:53 a. m.	12:17 p. m.	1.27	11:00 a. m.	11:44 a. m.	0.01	0.10	0.23	0.28	0.47	0.71	0.88	1.05	1.18	1.23	1.25	.....	.....	.....	.....
Santo Domingo, S. Dom.	1	3:00 a. m.	4:30 a. m.	1.70	3:08 a. m.	3:50 a. m.	T.	0.19	0.23	0.30	0.54	0.83	1.10	1.37	1.60	1.65	1.67	.....	.....	.....	.....
Do	21	11:20 a. m.	12:45 p. m.	0.69	11:26 a. m.	11:45 a. m.	T.	0.21	0.37	0.53	0.63	0.66	0.67	.....	.....	.....	.....	.....	.....	.....	.....
Do	24	12:50 p. m.	1:30 p. m.	0.56	1:13 p. m.	1:30 p. m.	T.	0.20	0.36	0.55	0.56	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Willemstad, Curaçoa	26	.....	.....	0.40	.....	.....	.....	.....	.....	.....	.....	.....	0.39	.....	.....	.....	.....	.....	.....	.....	.....

*Self register not working.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, September, 1902.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F	29.91	30.05	+.08	54.8	+ 0.8	62.7	46.9	1.44	−2.27	.....
Sydney, C. B. I.	30.07	30.11	+.10	59.8	+ 3.3	67.6	52.0	3.92	+0.64	.....
Halifax, N. S.	30.00	30.10	+.06	60.8	+ 3.2	69.8	51.7	4.64	+0.93	.....
Grand Manan, N. B	30.02	30.07	+.04	57.4	+ 1.3	63.9	50.9	3.57	+0.40	.....
Yarmouth, N. S	30.04	30.11	+.06	57.4	+ 1.3	65.5	49.3	4.42	+0.97	.....
Charlottetown, P. E. I	30.04	30.08	+.07	61.1	+ 3.8	69.6	52.7	2.63	−0.77	.....
Chatham, N. B	30.01	30.03	+.03	58.5	+ 3.1	70.0	47.0	4.14	+1.43	.....
Father Point, Que.	29.99	30.01	+.03	52.9	+ 2.5	60.3	45.5	3.21	+0.08	.....
Quebec, Que	29.71	30.03	+.02	57.5	+ 2.4	65.2	49.8	4.26	+0.59	.....
Montreal, Que	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bissett, Ont	29.41	30.01	−.02	55.2	− 0.5	67.0	43.5	4.44	+1.16	.....
Ottawa, Ont	29.74	30.04	.00	60.7	+ 3.3	70.0	51.3	1.23	−1.46	.....
Kingston, Ont.	29.71	30.02	−.02	61.9	+ 1.9	69.7	54.2	1.34	−1.46	.....
Toronto, Ont	29.62	29.99	−.07	60.3	+ 1.3	68.9	51.8	3.36	+0.11	.....
White River, Ont	28.61	29.93	−.05	49.0	− 1.3	60.4	37.7	3.09	+0.32	.....
Port Stanley, Ont	29.36	30.00	−.06	59.9	+ 0.4	68.6	51.2	5.05	+2.32	.....
Saugeen, Ont	29.29	29.99	−.06	60.2	+ 2.7	67.3	53.1	2.82	−0.12	.....
Parry Sound, Ont	29.29	29.97	−.06	59.0	+ 3.0	67.4	50.6	5.51	+ 1.84	....
Port Arthur, Ont.	29.19	29.90	−.08	50.2	− 2.0	58.6	41.8	1.99	− 1.49	....
Winnipeg, Man	29.03	29.86	−.08	52.8	+ 0.3	65.0	40.6	2.01	− 0.02	....
Minnedosa, Man	28.08	29.89	−.05	50.3	− 0.2	63.9	36.7	0.62	− 0.74	....
Qu'Appelle, Assin	27.62	29.85	−.07	51.3	+ 0.2	64.7	37.9	0.66	− 0.67	....
Medicine Hat, Assin	27.65	29.91	−.01	56.2	+ 1.2	72.4	40.0	0.22	− 0.96	....
Swift Current, Assin	27.36	29.92	.00	52.2	− 0.9	66.6	37.7	0.73	− 0.49	....
Calgary, Alberta	26.36	29.88	−.04	48.7	− 1.1	62.1	35.3	1.57	+ 0.21	....
Banff, Alberta	25.36	29.93	.00	45.3	− 0.5	56.7	33.9	2.71	+ 1.04	1.0
Edmonton, Alberta	27.58	29.86	−.04	49.4	+ 0.1	61.1	37.7	1.28	− 0.05	....
Prince Albert, Sask	28.26	29.81	−.09	49.0	+ 0.6	60.4	37.7	0.63	− 0.65	....
Battleford, Sask	28.14	29.86	−.04	51.2	− 0.6	64.4	38.0	0.41	− 0.84	....
Kamloops, B. C	28.75	29.97	.00	56.8	− 0.6	68.7	44.8	1.26	+ 0.41	....
Victoria, B. C	29.98	30.07	+.06	56.5	+ 1.7	63.9	49.1	2.31	+ 0.15	....
Barkerville, B. C	25.68	29.99	+.01	43.4	− 3.3	54.1	32.7	3.70	+ 0.79	2.0
Hamilton, Bermuda	29.91	30.07	.00	77.7	+ 0.3	83.0	72.4	2.04	− 4.47	....

TABLE VII.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Tennessee River.—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Bridgeport, Ala	402	24	1.9	28, 29	0.2	3–5	0.7	1.7
Florence, Ala	255	16	1.9	30	0.1	6–16, 22–25	0.3	1.8
Riverton, Ala	225	25	1.7	30	−1.4	10, 14, 15, 24	0.8	3.1
Johnsonville, Tenn	95	24	2.0	30	0.4	15–17	0.9	1.6
Cumberland River.								
Burnside, Ky	516	50	1.3	27	0.7	19	1.0	0.6
Carthage, Tenn	305	40	2.0	30	−0.1	22, 23	0.7	2.1
Nashville, Tenn	189	40	4.4	30	1.0	17, 18, 22, 23	2.8	3.4
Clarksville, Tenn	126	42	5.2	25	0.1	15, 16	2.1	5.1
Arkansas River.								
Wichita, Kans	832	10	2.5	1	1.4	20, 21	1.7	1.1
Webbers Falls, Ind. T	465	23	10.7	27	1.9	20	6.1	8.8
Fort Smith, Ark	403	22	11.1	28	3.2	21, 22	6.7	7.9
Dardanelle, Ark	256	21	10.6	29	2.2	22–24	5.6	8.4
Little Rock, Ark	176	23	10.9	30	3.5	26	6.8	7.4
White River.								
Newport, Ark	150	26	2.2	4	1.0	28–30	1.5	1.2
Yazoo River.								
Yazoo City, Miss	80	25	0.3	9	−1.5	18–23	−0.8	1.8
Red River.								
Arthur City, Tex	638	27	20.5	25	4.0	2–5	7.6	16.5
Fulton, Ark	515	28	22.5	27, 28	4.4	9, 10	8.5	18.1
Shreveport, La	327	29	14.5	30	3.4	15, 16	5.5	11.1
Alexandria, La	118	33	6.5	1	2.1	22	3.7	4.4
Ouachita River.								
Camden, Ark	304	39	16.4	26	4.2	5, 6, 11	6.4	12.2
Monroe, La	122	40	8.8	30	1.3	11, 12	2.8	7.5
Atchafalaya River.								
Melville, La	100	31	16.0	14	9.4	30	14.2	6.9
Susquehanna River.								
Binghamton, N. Y	306	16	6.0	29	2.7	21–24	3.1	3.3
Towanda, Pa	262	16	4.7	30	0.6	22–25	1.0	4.1
Wilkesbarre, Pa	183	17	10.3	30	3.0	22–25	3.9	7.3
Harrisburg, Pa	69	17	5.2	28	0.8	23–25	1.5	4.4
West Branch Susquehanna.								
Lock Haven, Pa	65	12						
Williamsport, Pa	39	20	2.8	29	0.2	20–24	0.7	2.6
Juniata River.								
Huntingdon, Pa	90	24	3.2	26–29	2.9	14–25	3.0	0.3
Potomac River.								
Cumberland, Md	290	8	0.9	26	0.0	18–25	0.2	0.9
Harpers Ferry, W. Va	172	18	0.0	4	−1.2	17–21	−1.0	1.2
James River.								
Lynchburg, Va	260	18	0.2	1, 5–7	−0.1	16–30	0.0	0.3
Richmond, Va.*	111	12	0.8	22	−1.0	10, 14, 15	−0.2	1.8
Roanoke River.								
Weldon, N. C	129	30	9.9	5, 11	8.1	1, 20, 21	8.7	1.8
Cape Fear River.								
Fayetteville, N. C	112	38	8.6	28	0.5	4, 5	2.2	8.1
Edisto River.								
Edisto, S. C	75	6	3.2	1	2.3	10–12	2.6	0.9

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Pedee River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Cheraw, S. C	149	27	12.1	11	1.2	25	3.0	10.9
Black River.								
Kingstree, S. C	52	12	0.7	1	−0.3	29, 30	0.2	1.0
Lynch Creek.								
Effingham, S. C	35	12	4.3	1	2.5	21-24, 28-30	3.1	1.8
Santee River.								
St. Stephens, S. C	97	12	7.3	16, 17	1.0	6	3.8	6.3
Congaree River.								
Columbia, S. C	37	15	5.8	11	0.3	21	1.1	5.5
Wateree River.								
Camden, S. C	45	24	21.2	11	4.5	25, 28	6.8	16.7
Waccamaw River.								
Conway, S. C	40	7	2.4	11	1.3	29, 30	2.0	1.1
Savannah River.								
Calhoun Falls, S. C	347	15	6.0	10	2.3	8	3.3	3.7
Augusta, Ga	268	32	14.0	11	6.7	4	8.7	7.3
Broad River.								
Carlton, Ga	30	11	8.2	26	2.1	6–8	3.0	6.1
Flint River.								
Albany, Ga	80	20	4.4	18	1.4	6, 8	2.9	3.0
Chattahoochee River.								
Westpoint, Ga	239	20	5.3	27	1.9	19, 20, 22, 24	2.6	3.4
Ocmulgee River.								
Macon, Ga	125	18	6.8	26	3.2	20	3.9	3.6
Oconee River.								
Dublin, Ga	79	30	4.2	30	−1.3	11	0.6	5.5
Coosa River.								
Rome, Ga	271	30	4.0	26	0.4	18–20	1.2	3.6
Gadsden, Ga	144	18	3.5	28	−0.7	20–24	0.2	4.2
Alabama River.								
Montgomery, Ala	265	35	3.9	30	−0.2	24	0.8	4.1
Selma, Ala	212	35	3.8	4	−0.3	19, 20	1.0	4.1
Tombigbee River.								
Columbus, Miss	303	33	−2.1	8	−3.5	16–20	−3.0	1.4
Demopolis, Ala	155	35	5.0	6	−2.3	21	0.0	7.3
Black Warrior River.								
Tuscaloosa, Ala	90	43	5.6	30	0.1	17, 18	2.7	5.5
Brazos River.								
Kopperl, Tex	369	21	6.0	10	−2.0	1, 2	0.6	8.0
Waco, Tex	301	24	7.2	11	3.1	3	4.5	4.1
Booth, Tex	76	39	6.5	16	3.1	6, 9	4.2	3.4
Red River of the North.								
Moorhead, Minn	418	26	7.7	1–7	7.3	30	7.5	0.4
Columbia River.								
Umatilla, Oreg	270	25	7.3	1	2.7	30	4.7	4.6
The Dalles, Oreg	166	40	10.2	1	4.2	30	6.6	6.0
Willamette River.								
Albany, Oreg	118	20	1.0	23–30	0.8	1–20	0.9	0.2
Portland, Oreg	12	15	5.3	3	1.8	25	3.3	3.5
Sacramento River.								
Red Bluff, Cal	265	23	0.2	1–6	0.0	18–27	0.1	0.2
Sacramento, Cal	64	29	7.9	1, 2	7.2	21-23, 29, 30	7.5	0.7

*27 days only.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during September, 1902.*

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Duration, 1902.
	660+ *Mm.*	660+ *Mm.*	° *C.*	° *C.*	%	%	*Mm.*	*Mm.*	*Hrs.*
1 a. m	3.57	3.72	17.76	17.46	92	94	2.3	0.6	2.00
2 a. m	3.47	3.38	17.33	17.24	92	94	0.7	0.4	1.17
3 a. m	3.13	3.00	17.21	17.01	91	94	0.4	0.4	1.00
4 a. m	2.98	2.88	17.06	16.86	90	94	0.2	0.3	0.91
5 a. m	3.03	2.94	17.00	16.75	90	94	.....	0.3	.....
6 a. m	3.23	3.20	17.08	16.55	89	94	.....	0.2	.....
7 a. m	3.46	3.59	17.14	16.72	88	92	0.1	0.1	0.20
8 a. m	3.73	3.95	18.91	19.25	79	85	.....	0.0	.....
9 a. m	4.18	4.15	20.68	20.80	75	77	0.3	0.1	0.17
10 a. m	4.38	4.22	22.64	23.21	70	71	.....	0.0	.....
11 a. m	4.28	4.22	23.70	24.36	64	68	.....	0.5	.....
Noon	3.88	3.90	24.74	25.02	63	69	.....	3.2	.....
1 p. m	3.27	3.29	25.01	24.96	66	69	2.8	16.3	1.09
2 p. m	2.73	2.83	24.89	24.22	65	73	9.6	26.8	2.41
3 p. m	2.45	2.43	23.86	23.10	70	78	16.4	29.0	3.59
4 p. m	2.35	2.31	21.96	21.72	82	83	54.0	59.3	5.06
5 p. m	2.50	2.47	20.80	20.50	84	86	50.7	54.2	11.90
6 p. m	2.74	2.80	20.01	19.85	86	90	28.0	43.2	10.25
7 p. m	3.08	3.27	19.38	19.10	90	92	14.6	35.2	5.83
8 p. m	3.53	3.65	18.99	18.71	90	92	20.6	20.1	6.09
9 p. m	3.95	3.94	18.68	18.46	91	93	23.7	12.9	6.58
10 p. m	4.30	4.28	18.41	18.16	92	92	23.4	15.4	7.01
11 p. m	4.32	4.25	18.20	17.84	92	92	6.5	2.8	3.92
Midnight	4.19	4.10	17.90	17.64	93	93	3.5	0.9	3.00
Mean	663.47	663.45	20.00	19.81	83	86	.....	.....	.....
Minimum	661.50	663.32	15.1	13.3	46	.....	.....	.....	.....
Maximum	665.9	659.53	28.6	30.0	100	.....	17.9	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....

REMARKS.—At San Jose the barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard register. ing instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 1.5 meters above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. Since January 1, 1902, observations at San Jose have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.5 seconds *in advance* of San Jose local time. The normals for pressure, temperature, and relative humidity have been adjusted to this time; the normal for rainfall in Table 1 and the sunshine observations and normal in Table 2 refer to local time. At Port Limon the hours of direct observation are 8 a. m., 2 and 8 p. m., San Jose local time; the barometer is 3.4 meters above sea level. The means for temperature and relative humidity in Table 4 are obtained from two-hourly readings given by a Richard self-registering thermometer.

TABLE 2.

Time.	Sunshine.		Cloudiness.		Temperature of the soil at depth of—				
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	0.15 *m.*	0.30 *m.*	0.60 *m.*	1.20 *m.*	3.00 *m.*
	Hours.	*Hours.*	%	%	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*
7 a. m	5.91	9.36	70	54	21.18	21.47	22.15	22.07	21.90
8 a. m	17.78	20.35	.....	.....	.....	.....	.....	.....	.....
9 a. m	17.01	22.20	.....	.....	.....	.....	.....	.....	.....
10 a. m	15.82	22.07	74	61	21.30	21.46	22.22	22.17	.....
11 a. m	13.74	20.07	.....	.....	.....	.....	.....	.....	.....
Noon	12.79	16.40	.....	.....	.....	.....	.....	.....	.....
1 p. m	14.21	12.48	82	83	21.72	21.62	22.22	22.17	.....
2 p. m	10.55	11.75	.....	.....	.....	.....	.....	.....	.....
3 p. m	8.80	8.65	.....	.....	.....	.....	.....	.....	.....
4 p. m	4.00	4.50	93	94	21.92	21.74	22.22	22.10	.....
5 p. m	2.66	2.08	.....	.....	.....	.....	.....	.....	.....
6 p. m	1.17	0.51	.....	.....	.....	.....	.....	.....	.....
7 p. m	.....	.....	88	92	21.87	21.76	22.18	22.08	.....
8 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m	.....	.....	79	77	21.69	21.75	22.19	22.09	.....
11 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	81	77	21.63	21.64	22.20	22.10	21.90
Total	124.44	150.42	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—*Rainfall at stations in Costa Rica, September, 1902.*

Stations.	Height above sea level.	Observed, 1902.		Averages.		
		Amount.	Number of days.	Number of years.	Amount.	Number of days.
	Meters.	*Mm.*			*Mm.*	
Sipurio (Talamanca)	60	292	18	2	260	18
Boca Banano	3	196	18	6	116	14
Port Limon	3	188	8	17	171	11
Swamp Mouth	3	.....	.....	4	123	9
Zent	20	179	15	1	76	11
Siquirres	60	.....	.....	3	188	11
Dos Novillos	122	304	21	.....	.....	.....
Guapiles	300	.....	.....	2	374	17
Cariblanco (Sarapiqui)	835	470	29	4	387	23
San Carlos	161	430	26	4	292	21
Las Lomas	266	.....	.....	2	289	12
Peralta	332	.....	.....	4	256	17
Turrialba	620	291	19	7	235	16
Juan Viñas	1,040	.....	.....	6	151	12
Santiago	1,100	.....	.....	1	157	22
Paraiso	1,336	.....	.....	1	186	18
Cachi	1,020	187	28	1	.....	.....
Las Concavas	1,337	220	22	1	213	17
Tres Rios	1,300	211	18	12	319	20
San Isidro Arenilla	.....	445	19	.....	.....	.....
San Francisco Guadalupe	1,187	235	18	6	233	23
San Jose	1,160	258	22	13	321	24
La Verbena	1,140	155	21	6	331	21
Nuestro Amo	791	85	22	6	290	20
Alajuela	950	256	14	2	341	25
San Isidro Alajuela	1,346	476	19	1	822	26

* Not received.

TABLE 4.—*Observations taken at Port Limon and Zent, September, 1902.*

Stations.	Pressure.			Temperature.			Relative humidity.
	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.	
	Inches.	*Inches.*	*Inches.*	° *C.*	° *C.*	° *C.*	%
Port Limon	755.24	759.99	757.20	20.0	32.0	25.35	88
Zent	.....	.....	.....	22.4	28.8	25.79	88

Stations.	Cloudiness.	Sunshine.	Rainfall.		Temperature of soil at depth of—		
			Amount.	Number of days.	0.15 *m.*	0.30 *m.*	0.60 *m.*
	%	*Hours.*	*Mm.*		° *C.*	° *C.*	° *C.*
Port Limon	64	.....	188.0	8	.....	.....	.....
Zent	83	144.34	179.0	15	27.13	27.20	27.12

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

September, 1902.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Chihuahua	4,684	24.24	86.0	59.0	72.1	65	5.37	ne.	.....
Guadalajara (Obs. del. Est.)	5,186	24.89	80.6	59.0	70.7	73	5.34	Calm.	.....
Guanajuato	6,640	.....	.....	.....	.....	.....	.....	.....	.....
Leon (Guanajuato)	5,906	24.24	82.9	54.0	67.3	77	7.30	ne	.....
Mazatlan	25	29.80	90.3	70.5	83.8	76	7.82	w.	.....
Mexico (Obs. Cent.)	7,472	23.00	78.1	51.8	61.3	70	3.11	nw.	ne.
Mexico (E. N. Agric.)	7,442	23.01	75.9	61.5	64.8	74	2.74	nw.	.....
Monterey (Seminario)	1,626	.....	.....	.....	.....	.....	.....	.....	.....
Morelia (Seminario)	6,401	23.90	82.4	53.6	63.1	83	4.07	s.	ne.
Puebla (Col. Cat.)	7,108	23.34	77.0	53.6	63.9	75	6.94	ene.	.....
Puebla (Col. d Est.)	7,118	23.32	75.6	48.9	62.1	75	5.90	e.	.....
Queretario	6,070	24.11	81.5	55.4	67.8	66	6.28	e.	.....
Toluca	8,812	21.93	77.0	43.7	57.4	73	7.49	ne.	.....
Zacatecas	8,015	22.51	77.4	47.8	61.0	71	5.53	e.	.....
Zapotlan	5,078	25.03	81.1	60.4	70.0	75	5.38	sse.	.....

Chart I. Tracks of Centers of Tropical Storms and Hurricanes, 1902.
XXX—75.

Chart I. Tracks of Centers of High Areas. September, 1902.

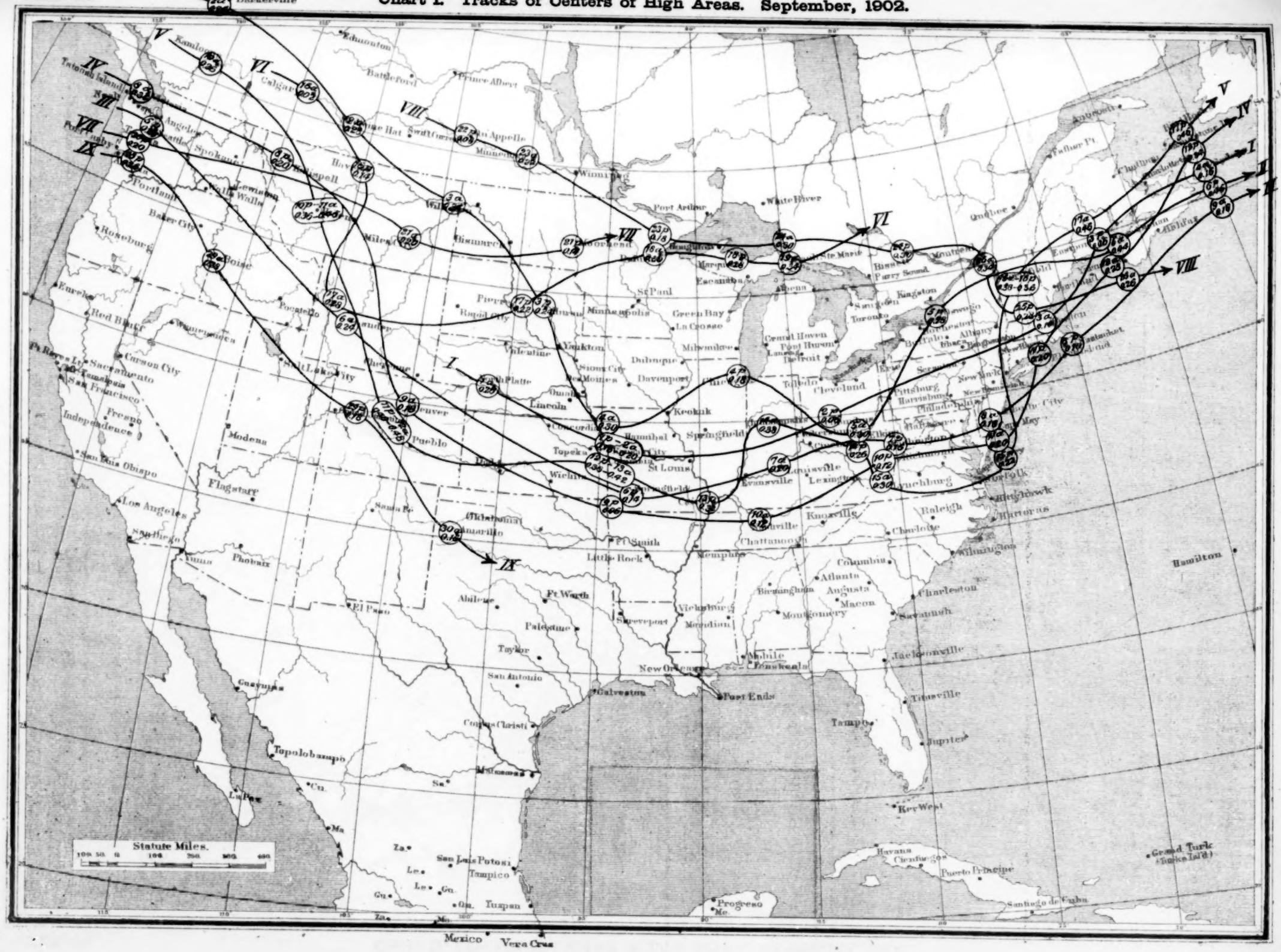


Chart II. Tracks of Centers of Low Areas. September, 1902.

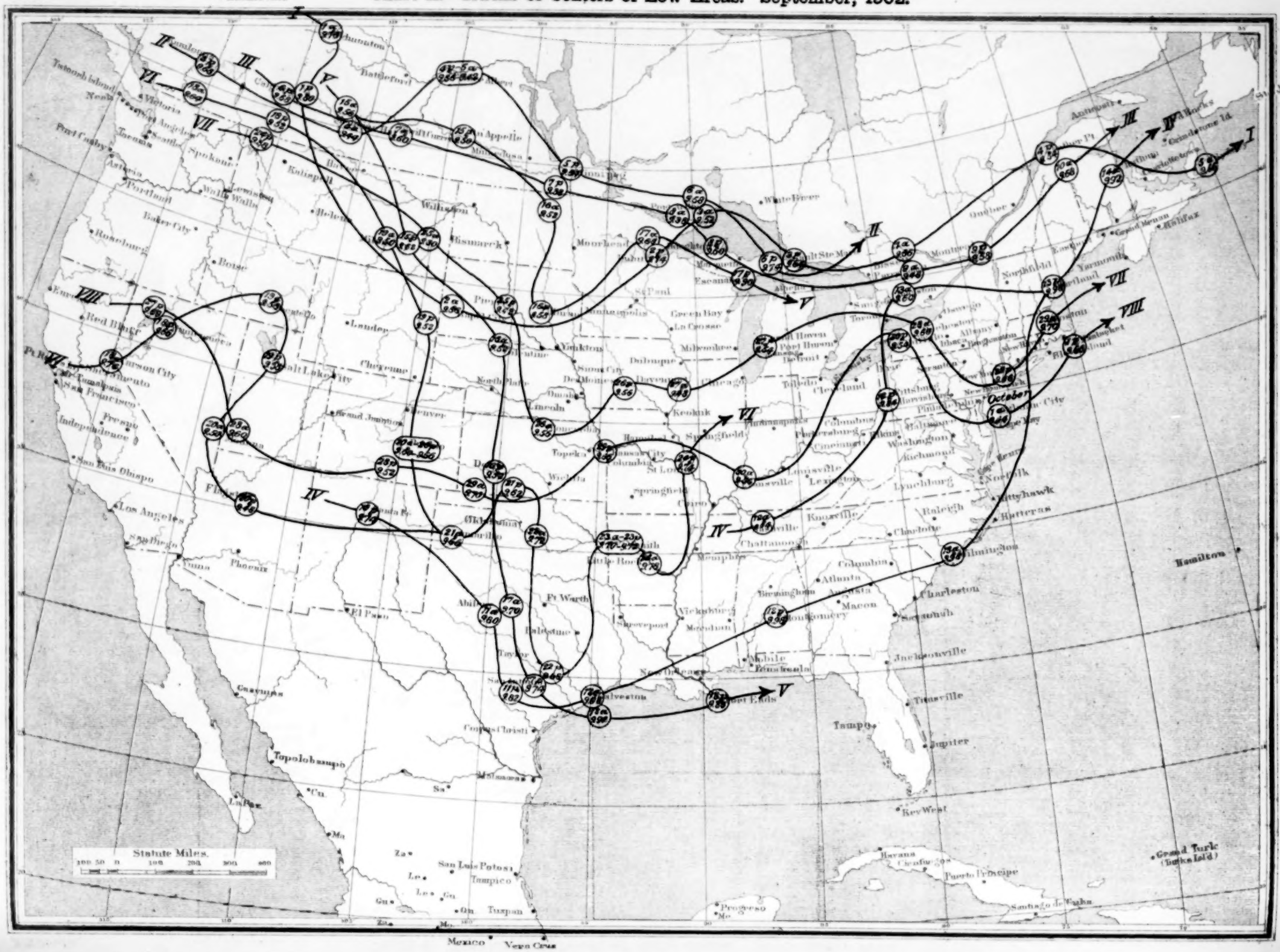


Chart III. Total Precipitation. September, 1902.

Barkerville

Chart III. Total Precipitation. September, 1902.

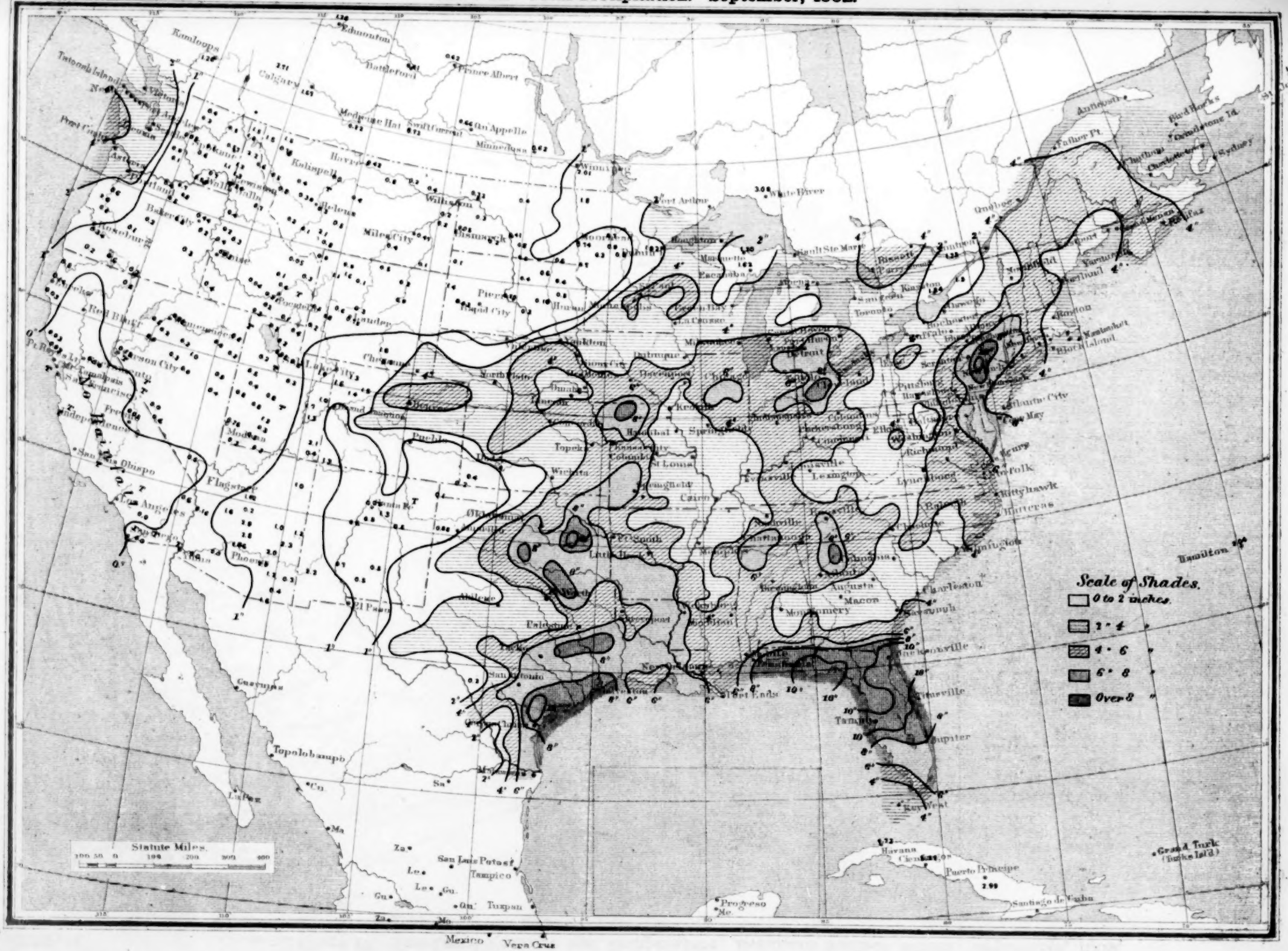


Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. September, 1902.

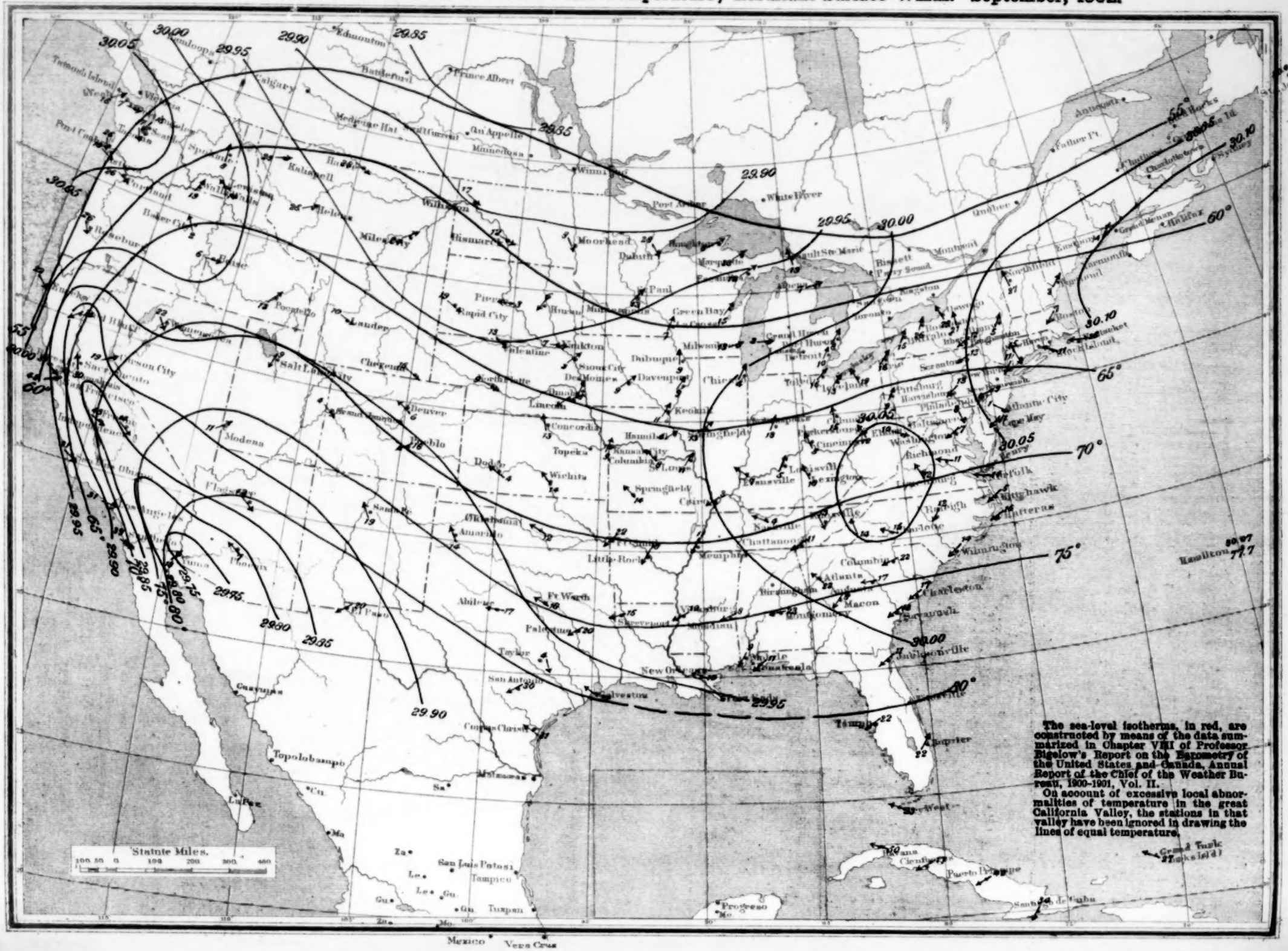
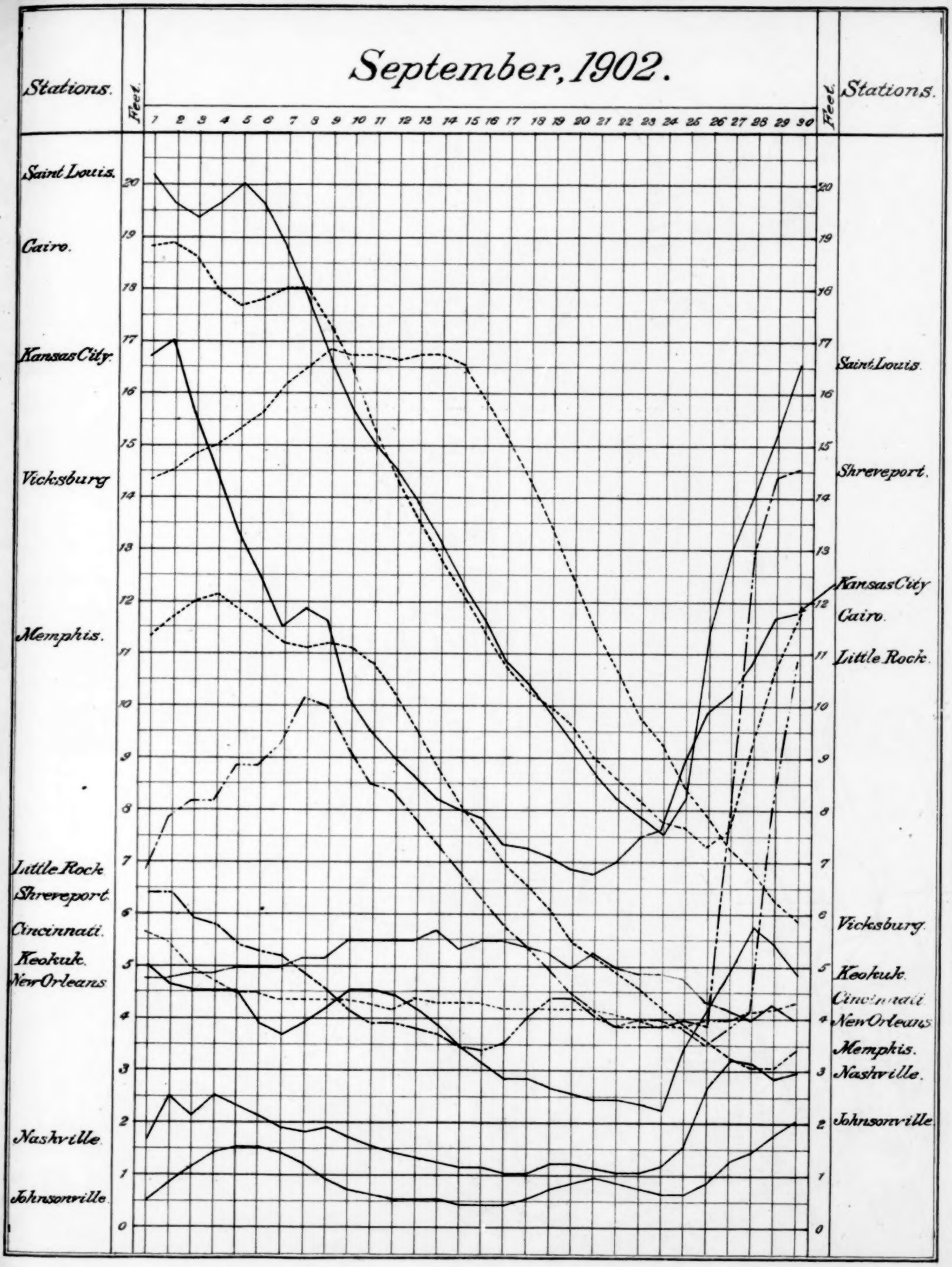
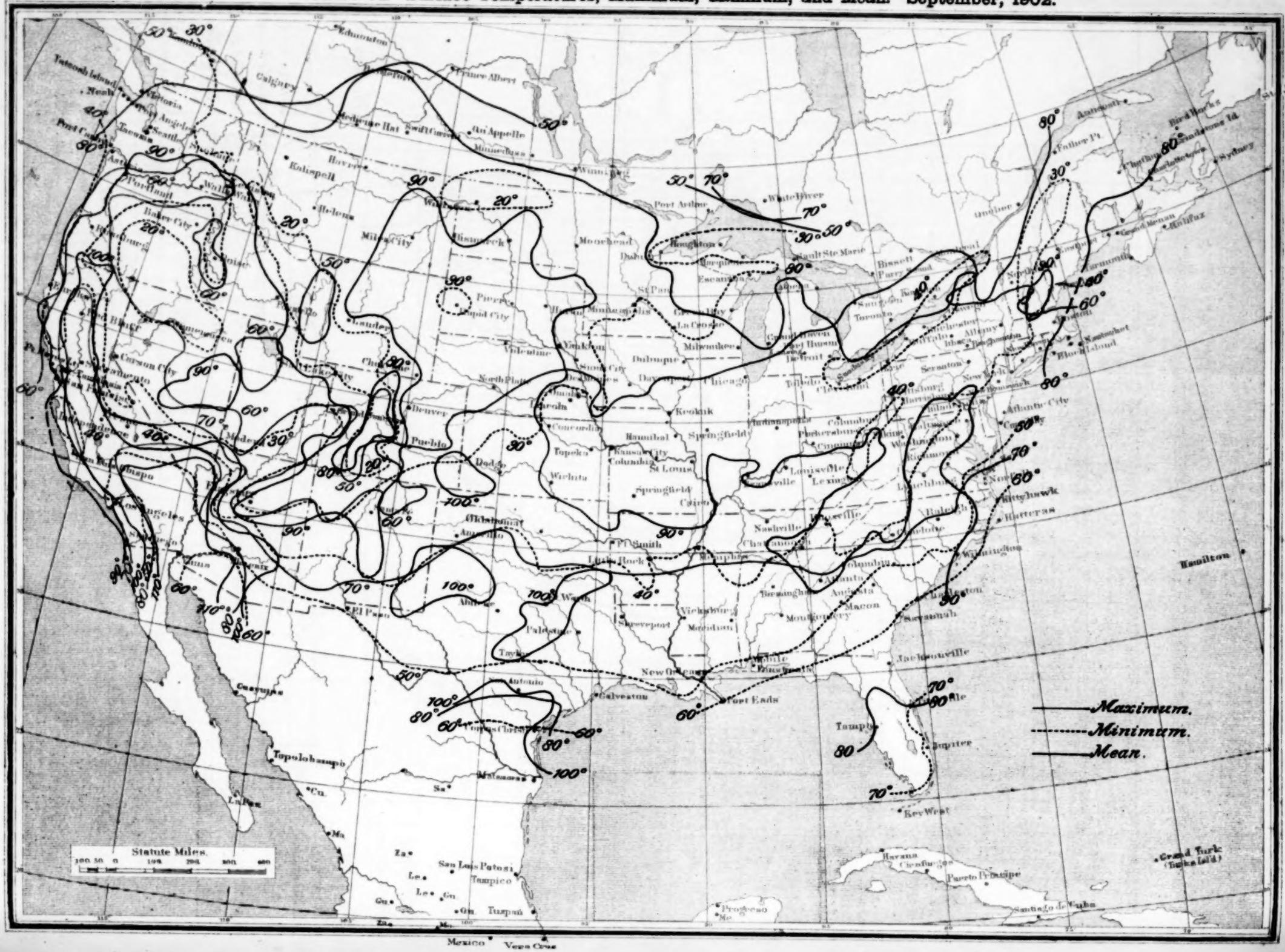


Chart V. Hydrographs for Seven Principal Rivers of the United States. September, 1902.



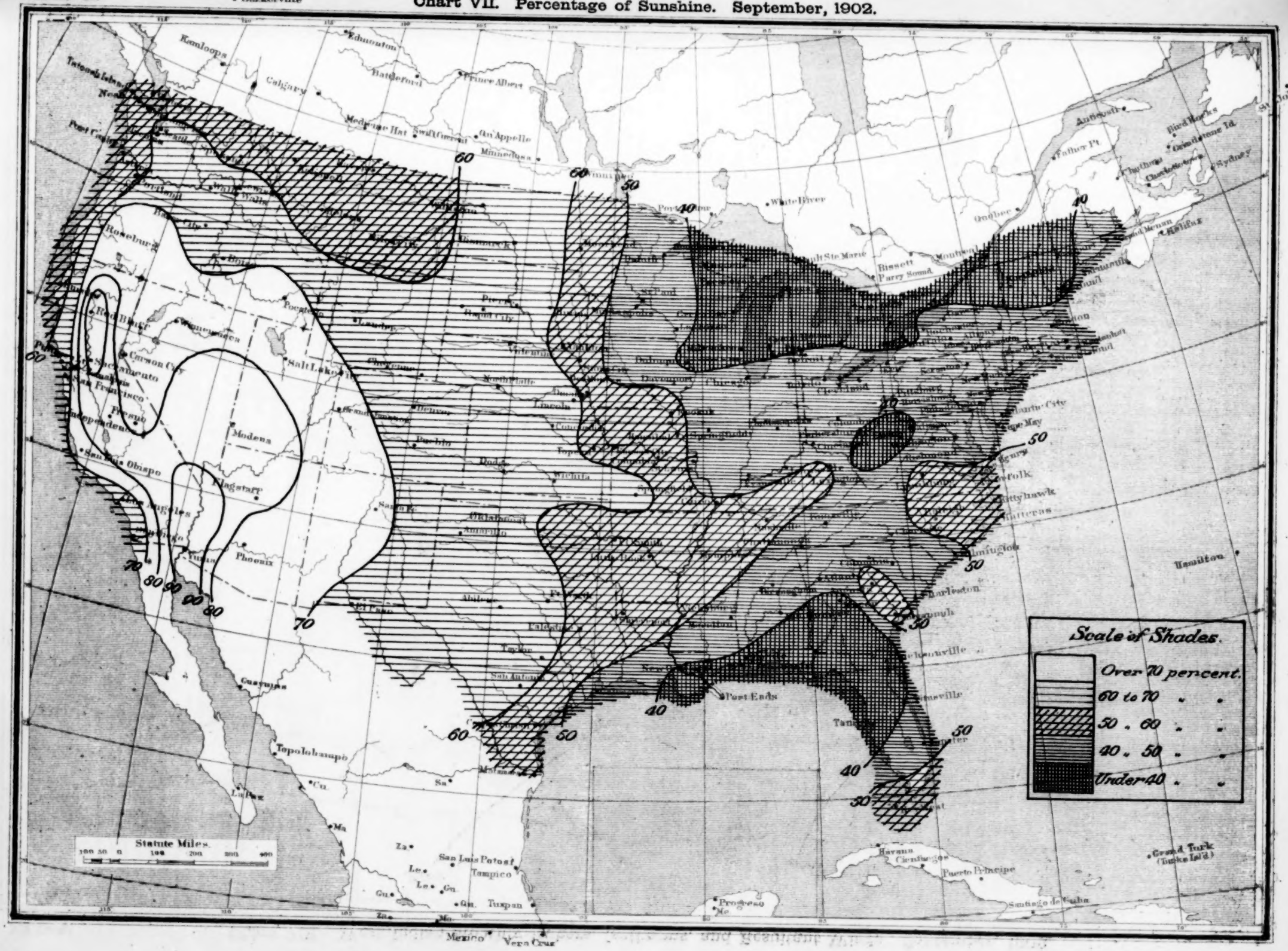
• Barkerville **Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. September, 1902.**



XXX—81. • Barkerville **Chart VII. Percentage of Sunshine. September, 1902.**

• Barkerville

Chart VII. Percentage of Sunshine. September, 1902.



Mexico Vera Cruz

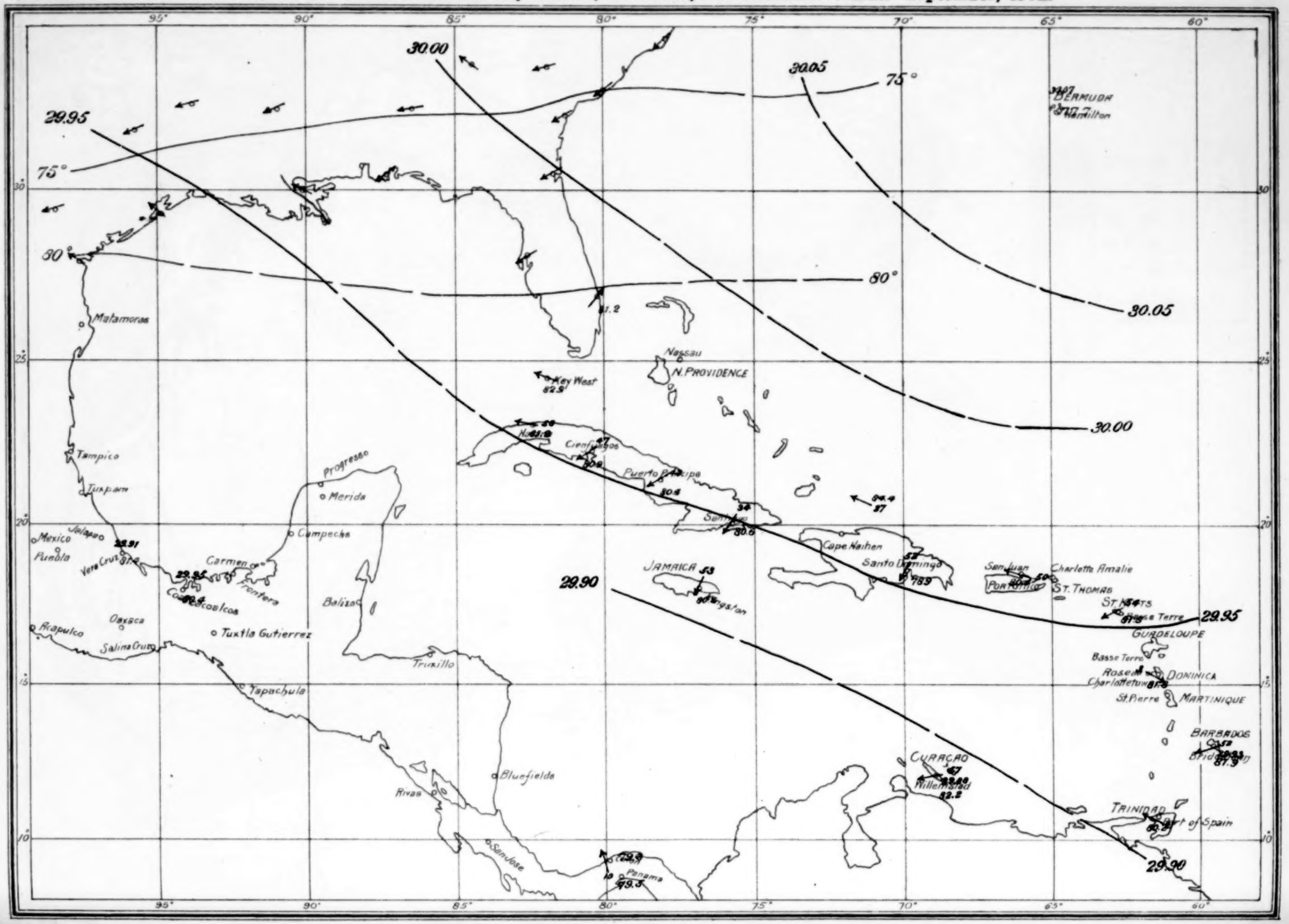



Chart VIII. West Indian Monthly Isobars, Isotherms, and Resultant Winds. September, 1902.